THE MAILING LIST

The Infantry School
MAILING LIST

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Containing the Latest Thought on Infantry

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PREFACE

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CHAPTER 1

Air-Ground Training

An Enthusiastic Platoon Leader Writes How Instruction In This Subject Is Conducted In His Unit

Dear John,

Salutations and congratulations!

So it's now Second Lieutenant John Henry Jones, is it? Good going, old man, I'm proud of you.

I'm especially glad to know that you like your new assignment. Just what you wanted, isn't it—platoon leader in a rifle company where your past experience as an enlisted man in a rifle unit will stand you in good stead. I'll bet you're already finding that being leader, instructor, and chief counsellor to 40 men entails enough responsibilities and problems to make it seem as if the weight you're carrying on your shoulders would make Old Man Atlas look like a piker. You see, I can talk like a Dutch Uncle because I've had a head start on you in this business of running a platoon, having had mine for about 11 months now. Seriously, Johnny, if I can ever help you out on anything that seems perplexing or if I can answer a question or two, let me know. I'm just beginning to realize how much there is to know about the job of leading a platoon, but I might be able to give you a few pointers now and then.

Take this question of air-ground instruction you were asking about. I'm glad you picked that as your first question, because that's something our outfit is pretty hepped up about. You see, our new division commander has just

come back from North Africa. What he saw there on the receiving end of German air support in Tunisia, together with his experience as part of a powerful and successful air-ground team, convinced him that better air-ground teamwork must be achieved and that outfits still training in this country must drill and practice in this whole matter of air-ground cooperation until we have air-ground teamwork as smooth and swift as lubricated lightning and as deadly as a cobra's kiss.

You said in your letter that your company commander had turned over to you the responsibility of instruction in the subject of air-ground cooperation. That's a pretty big order and you probably feel lost right now, but let me give you a little advice. First of all, organize your subject. This is too big a field to explore aimlessly and half-heartedly. You must know exactly what you're after, what you want to teach, the way in which you're going to do it, and what you want to accomplish. You'll find it a subject about which your men will be very enthusiastic, and many of them will learn more about it on their own time once you've given them the required working basis. But, you've got to go at this thing systematically.

In our outfit, we've found that the large subject of air-ground cooperation breaks down logically into several smaller subjects: identification of friendly aircraft by ground troops, identification of ground troops to friendly aircraft, and support of ground troops by aviation (including the initiation of a call for support, air-ground communication, and the fulfillment of the mission by the air forces).

Of course, the first thing you'll want to do is to teach your men to recognize friendly aircraft. Back in the days when the enemy had control of the air, we took it for granted that if a plane came zooming over our lines, it was enemy, and ZOWIE, we'd let him have it. But now that our Air Forces are gaining control of the air over combat areas, we've got to be able to distinguish friend from foe instantly and without guesswork.

FIGURE 1.—The primary aim of the tactical air force is to establish and maintain air superiority. Once air superiority has been obtained, air and ground forces can carry on the battle with little interference by enemy planes. Air superiority is obtained by attacking enemy airdromes and by destroying enemy planes on the ground and in the air. The battle for the capture of German forces in Tunisia began, according to General Kuter, with the attack of German airdromes by 90 night bombers. B-26's and A-20's took up the daytime attack. By the time the ground forces pushed off three days later, 112 German planes had been destroyed.

The identification of friendly planes needs some of that planning and organization I was telling you about a moment ago. Too many instructors think of the subject as an interesting and diverting way of passing the time and they start teaching all the planes they can find out anything about—both friendly and enemy. That is the wrong approach. In the first place, the men simply won't remember the characteristics of all of them, and in the second place, they won't need to know them because they won't come into contact with all of the planes in each theater of operations. Instead, in all your instruction here, you should stick to U.S. planes only. Later on, your outfit will be directed to learn common British planes. And finally when you're on shipboard, actually on your way to the Big Fight, they'll study the common planes of the particular enemy whom you'll be most likely to meet. For instance, if you sail across the Atlantic, you'll conduct a course in German and Italian aircraft, but if you sail toward the setting sun, you'll concentrate on teaching them to recognize Tojo's planes.

So, that's the first thing to remember. Concentrate on common American planes in your training. Just which ones are studied will, of course, change from time to time, just as the planes themselves are developed, used, then modified or changed in favor of something bigger, faster, and better. Right now, you should concentrate on the 13 Army planes used in the air-ground tests devised by the Army Ground Force headquarters. I'll tell you a lot more later about these tests because they're going to be quite an important phase of your air-ground training. Here are the planes which will be involved in the air-ground tests and on which you should concentrate your training in the identification of aircraft:

L-1 Vigilant
L-4 Grasshopper
P-38 Lightning
P-39 Airacobra
P-40 Warhawk or Kittyhawk
A-20 Boston or Havoc
B-25 Mitchell
B-26 Marauder or Martian
B-17 Flying Fortress

P-47 Thunderbolt	B-24 Liberator
P-51 Mustang	C-47 Skytrain

NOTE: In addition to these planes, you should also study the L-5 Sentinel and the L-6, which may replace the L-1 and L-4.

In teaching identification of these planes, the first thing to do is to familiarize your men with the important items of nomenclature of the planes so that they will know what you're talking about when you mention "trailing edge," "leading edge," "ring cowling," and "nacelle." You should point out that B stands for the medium and heavy bombers, A for the light bombers, P for the fighters, C for transport planes, L for liaison planes, F for reconnaissance (photographic) planes, and so on.

After this brief orientation course on nomenclature, start teaching the distinguishing features of the individual planes. This can best be done by means of silhouettes and the WEFT system. No, you're wrong—WEFT has nothing to do with either WAVE or WAC. The WEFT system calls attention to four parts (Wings, Engine, Fuselage, Tail) of the plane which an aircraft spotter can most readily see and describe quickly and accurately. From a combination of these features, you can determine not only the nationality of the planes, but you can also figure out the type of operation of which the plane is capable, the distance it can operate from its base, and the possible additional forces which may be anticipated. The WEFT system analyzes the distinguishing features of a plane under the following headings:

WINGS: First, look at a plane's wings. Is it a monoplane or a biplane? Chances are it's a monoplane. Then determine whether it has a high wing (like the B-26), mid-wing (P-38), low-wing (P-39), or parasol wing (L-1). Next, are the wings horizontal (B-26), dihedral (P-47) (you'll want to note the degree of dihedral, such as pronounced, moderate, or slight), gull, or inverted gull? Also, note the shape of the wings and wing tips. Are both edges untapered (L-1 and L-4); is the leading edge tapered (C-47);

is the trailing edge tapered (A-20); or are both edges tapered (B-26)? Are the wing tips rounded (B-26) or square (P-51)?

ENGINES: The next step in the WEFT system is the engines. It's easy to count the number of engines. Then, figure out whether they are "in-line," having a pointed, sharp nose (P-39), or if they are radial and have a blunt nose (P-47). Also, in the manner of the attachment of engine to the wings, is the engine top-set, middle-slung (B-17) or low-slung (B-26)? Note the nacelles. Do they protrude from only the leading edge of the wing (B-17) or from both leading and trailing edges (A-20)?

FUSELAGE: The fuselage is the third step on the WEFT system. Note the general shape of the fuselage. Is it long and narrow (B-17), cigar- shaped (B-26), or heavy and thick (P-47)? Also, is the nose of the fuselage long and pointed (P-39 and P-51) or short and stubby (P-47)? Note whether the nose is rounded (B-25), or shark-like (P-40).

TAIL: The last feature in the WEFT system is the tail. Does it have a high tail (B-17 and A-20)? Are the tail fins pear-shaped (B-25), oval (B-24), or egg-shaped (P-38)? Are there twin tail fins (B-25), or only one (P-39), or twin tail booms (P-38)? Is the tail plane heart-shaped (P-39 and P-40), rectangular (P-51), or rounded (A-20)?

In addition to these four main features, it is helpful to note peculiarities such as the number, size, and location of cockpits and turrets, the presence of fixed or retractable wing floats and tail wheels, and other prominent external fittings.

During this phase of the subject of aircraft identification —in which you are stressing the characteristic features— you will want to make use of certain training aids. Training Circular No. 67, War Department, 1942, will tell you just what training aids are available to you. Among the most important are posters, each one showing three silhouettes of a plane—head-on view, bottom view, and side view. They should be used during your instruction in the characteristic features of planes. When you are not using them in your

FIGURE 2.—Isolation of the battlefield is the second priority task of the tactical air force. This includes the disruption of enemy lines of communication, the destruction of supply dumps, installations and enemy troop concentrations in rear areas. If the enemy is denied food, ammunition, and reinforcements, swift, aggressive action by the ground forces will put him to rout. B-26's, shown above blasting enemy railroad lines, were used effectively for this purpose in the North African campaign.

lectures, you should post them in your day room, mess hall, and even in the latrine. In our regiment, we have what we call an "Airplane of the Day," and on each company bulletin board during that day we display a poster showing three silhouette-views of an American plane. During the day, we incorporate in all our instruction and in every appropriate phase of activity, the characteristics of that particular "airplane of the day." We then wait for two days and post another "plane of the day," either removing the first poster or letting it remain on the bulletin board so that comparisons among the planes can be made. We keep this up until we have posted all of the planes we teach, then we repeat the process.

Cardboard silhouette models of planes and airplane recognition disks will also be sent your unit and you should check with your S-3 in regard to using these in your training. Later on, plastic models may be available. Meanwhile, your unit might, of course, use some of its training funds to purchase plastic models, aircraft identification playing cards, and other training aids you desire.

Silhouette-roulette wheels will be helpful to you in this phase of training, and your supply sergeant and his helper can make these without much trouble. Look in Conference Course Training Bulletin No. AG-1, 23 July 1942, for details of construction.

Probably, the most effective training aids are the training films and film strips. These have been carefully prepared and many of them are especially designed to fit into your instruction in the WEFT system. Be sure to include time in your training schedule for some of them and make arrangements in advance for obtaining the projector, the films, and film strips, as well as the room in which to show the films and strips. Look in FM 21-7 for a list of the various films and film strips as well as instructions on how to use them. You'll find a great many films and strips on aircraft identification, but let me pick out a few which we have found to be most effective in our training:

TRAINING FILMS

TF 1-258, Identification of Aircraft—General Characteristics and Types of United States Military Airplanes. (8 min.)

1-259, Identification of Aircraft—Distinguishing Features of U. S. Military Airplanes. (15 min.)

1-672, WEFT System of Aircraft Identification. Part I.—Basic Characteristics. (13 min.)

1-673, WEFT System of Aircraft Identification. Part II.—Special Characteristics. (10 min.)

1-906, Identification of U. S. Army Aircraft—P-38E Lockheed (2-engine) Pursuit. (9 min.)

1-912, Identification of U. S. Army Aircraft—P-39L Bell Pursuit. (9 min.)

1-910, Identification of U. S. Army Aircraft—P-51.

1-619, Identification of U. S. Army Aircraft—B-25 Medium Bomber. (10 min.)

1-902, Identification of U. S. Army Aircraft—A-20B. (10 min.)

1-900, Identification of U. S. Army Aircraft—B-17FW. (9 min.)

1-901, Identification of U. S. Army Aircraft—B-24D. (9 min.)

1-908, Identification of U. S. Army Aircraft—C-47 and C-53. (9 min.)

FILM STRIPS

FS 1-31, A Preliminary Study of the Identification of Aircraft.

1-38, Points to Look for in the Identification of Aircraft.

After the men have spent enough time on the WEFT system so that they are able to analyze the planes by means of the four main identifying features, they should concentrate on recognizing the "total form" of the plane. This is a natural step forward in the identification of aircraft, for

you will find that as you become familiar with the planes and have more experience in identifying them, you will not have to go through the detailed analysis of the four main features each time you try to figure out what type of plane it is.

The Army Air Forces uses this "total form" method of recognition training (they call it flash meter training or the Renshaw system) and require their students to identify aircraft by means of projected images flashed on a screen at split-second intervals varying from three seconds to 1/75th of a second. Quite a bit of equipment is required for their method, including projector, slides, and a slide shutter. If your unit does not have a high-speed shutter, you can secure the same effect by covering the lens of the projector with cardboard or other material after the picture has been shown for the desired length of time.

Another substitute for the flash meter training is a system of "flash cards" which our unit has devised. These flash cards consist only of plain white cardboard cut to any size desired (6" by 8" or 8" by 10", for instance) on which are pasted silhouettes of the planes being taught. Included in the series of flash cards are three views (head-on, bottom, and side) of each plane. Only one silhouette is used on one card. The cards will be shown one at a time for progressively decreasing periods of time. On the back of each card is written the name and distinguishing characteristics of each plane. One of the best things about these flash cards is that they can be used indoors, outdoors, and on shipboard, without other special equipment.

Another method of identification of aircraft which you should note is identification by sound. You know how even as a boy you used to be able to distinguish a tractor from an automobile, a Model T Ford from a Rolls Royce, or a Model A Ford from a Cadillac by the sound of their motors. It's the same way with planes. I've talked to several officers back from the combat zones and they say that the peculiar knocking sound of German planes is clearly discernible, and that although it is difficult to describe accurately, every

soldier from the General on down to Johnny Doughboy becomes familiar with it, and by that means can often identify enemy planes before they become visible.

Of course, the very best method of teaching identification of planes is to give your unit a chance to see them both on the ground and in the air. It would be ideal if you could take your men to an airport where types of the various Army planes were available for inspection. The men could inspect the various planes on the ground, supervised, of course, by Air Force officers as well as by officers from your own unit who had boned up on their knowledge of the planes. Then, as the planes took off and made landings, the officers could point out their distinguishing characteristics. This would be the most realistic type of instruction in aircraft identification.

Along this line, let me tell you of a plan developed in our regiment in order to obtain experience in identifying aircraft under realistic situations. Whenever we are marching or conducting a class out in the field or on the parade grounds and a plane flies over, if it is at all convenient, the instructor stops the class and asks the men to identify the plane and sometimes even to identify themselves to the planes. You know how low-flying planes always steal the men's attention anyway; well, this practice of giving the men practical training in airplane identification makes constructive use of what otherwise would be a distraction. I understand that our higher headquarters now plans to route aircraft over ground troops on occasions when this would not interfere with the training of either component. When such arrangements are made, it's up to you and me to see that the men really benefit by them.

Of course, there will be occasions when no planes at all will be available in training, but that should not hinder you if you make use of the visual aids I told you about earlier. The next thing you'll be saying is, "The training aids are fine, but when will I ever have the time to use them?" And, that *is* a real question. It's one to which you'll have to figure out the answer for yourself. The amount of time definitely

allotted for training in identification of aircraft will not be sufficient for you to accomplish all you will want to accomplish. So, the best you can do is to lay the groundwork in the time allotted, then continue the training in this subject by combining it with other subjects whenever possible and by bringing it continually to the attention of the men.

Remember that in teaching aircraft identification, it is essential to arouse the interest of your men. Make them air-minded. Get them to notice, think about, and talk about airplanes. Encourage them to clip articles and pictures from newspapers and magazines for an air-ground scrapbook to be kept by your platoon. You'll be surprised how much material you can get from newspapers, popular picture magazines and weekly news magazines. And you'll be pleased to find how much this material aids you in your training. Your unit gets the Army Orientation Course's Weekly "Newsmap," doesn't it? On both sides of the map there are often airplane pictures and articles which you can use in your instruction. For instance, the issue of 20 July 1942 contained a display of the WEFT system, the 2 November 1942 number had a lot of recent information on American planes, and the issue of 5 April 1943 had one side devoted to British aircraft.

Well there, Johnny, is a lot of information which I hope you'll be able to use. The reason why I think you will is that we've been using it in our training and it's proved to be effective. I realize, of course, that I've talked about only one phase of air-ground, but let me know how you're coming along on that phase and what questions you have, and I'll write some more on the training which follows.

So, polish up those gold bars, and get going on that platoon.

Good luck to you,

Bill.

Dear Johnny,

So you took my advice and put away the posters and models of foreign planes which you had displayed in your day room and mess hall? You are right in doing that; there's no use in confusing the men with a lot of planes which they might never see. It's as I said in my last letter, concentrate on American planes now; later on you'll be required to learn common British planes. And finally when you're on your way across the Big Swim, learn the common planes of the enemy you're going up against.

You must have taken me at my word and talked with your company commander about organizing your training and getting training aids through your S-3. As soon as possible, you'll need to familiarize yourself with the appropriate field manuals and training bulletins, especially the new FM 100-20, Command and Employment of Air Power, 30 June 1943.

In addition, you should consult the Air-Ground series of Conference Course Training Bulletins prepared at the Infantry School, as well as War Department Training Circular Number 56, 1942, which deals with the identification of ground forces to friendly planes—the second phase of the air-ground subject.

This second phase, identification of ground forces to friendly aircraft, is just as much a sticker as the first phase, identification of friendly aircraft by ground forces. Our high-powered modern planes go too fast and the pilots and observers have too much to do to keep circling over the battlefield trying to figure out whether the men and vehicles down there beneath them are friendly or enemy. Even when the units and vehicles aren't camouflaged, markings such as the white star are difficult to see at a distance. It is necessary for ground troops and vehicles to have some means of positively identifying themselves to friendly planes without exposing themselves unnecessarily and for too long a period. Five ways by which this may be accomplished are: radio, panels, colored smoke, pyrotechnics, and lights.

Radio, of course, is the best means of recognition and

identification whenever it is possible to maintain communication between the planes on a ground support mission and the ground unit being supported. The SCR-284 radio sets within the Infantry regiment can be used for this purpose. However, weather conditions, jamming by the enemy, and lack of radio equipment often make it necessary to turn to other methods of identifying ourselves to the planes. Some of these other methods are just beginning to have widespread use, yet so far they have proved extremely effective. We should not depend on just one of these methods, however, but should use several of them or, if necessary, use them all simultaneously.

You have probably noted that the current Tables of Organization and Equipment provide panel sets AP-50-A, AP-30-C, and AP-30-D for Infantry. The first set is for identification purposes and the last two are for signaling. Panel set AP-50-A offers several colors, the use of which can be prescribed in your Signal Operation Instructions (SOI) as an identification code in order to avoid confusion with the panels the enemy uses.

The identification panels (AP-50-A) are used mainly by vehicles, troops on the march, or by front-line units. When you use them on vehicles it is important to remember that the identification must not depend on a definite sequence of colors, because one or more vehicles forced out of the column might destroy the sequence. Instead, the identification should depend upon colors and color combinations. Then, if one or more vehicles fall out of the column, you still have the correct colors somewhere within the column.

Foot troops carrying panels on the march display them at the head and tail of the column. When the panels are used to mark the front lines, they should be displayed by front-line platoons only, and be laid in the open in the vicinity of the platoon command post. When you once put out the panels, be sure to take them up again as soon as the friendly plane signals that he understands your message or as soon as he leaves the area. To leave them out for any length of time is asking for trouble.

The signaling panels AP-30-C (black, for snow-covered terrain) and AP-30-D (white, for normal terrain) are used by battalions and higher units to identify themselves to friendly aircraft, to indicate message dropping and message pickup grounds, and to transmit short, prearranged messages to aircraft in accordance with the panel code in force.

If you have to use improvised panels, be sure that they are of large, simple design. They should be at least 10 square feet in area.

Do not fail to include in your instruction in panels a showing of FS 7-109, Air-Ground Communication, Part I, Marking of Vehicles as a Means of Identification. This film strip is done in colors and will be released shortly.

The colored smoke, as a means of identifying ground units to planes, proved very satisfactory in North Africa. It's valuable because it can be easily distinguished from the smoke normally present on the battlefield and can be seen from elevations as high as 10,000 feet. The yellow is especially brilliant and distinguishable. There are seven colors available now in the form of the M16 colored smoke grenade—red, orange, green, violet, yellow, blue, and black. (See Training Circular No. 80, War Department, 7 June 1943, Grenades.) The mixture in the grenade starts burning almost immediately after ignition, and burns for 2 minutes and 20 seconds. But, don't depend upon just one grenade to attract the attention of a plane. Use several grenades so they will give out a large volume of smoke, and throw them on the ground at a location where they can be seen from the air. Another red smoke grenade, the AN-M3, is particularly valuable as a ground-to-plane signaling device in snow-covered regions. It burns for the same length of time as the M16 and is constructed in a manner to prevent its sinking into the snow.

Of course, in order to prevent confusion with the enemy's signals, the Signal Operation Instructions (SOI) should prescribe the color of smoke to be used during a particular operation. For instance, perhaps one division CP will be revealed by two streamers of violet smoke while another might have a streamer of black and a streamer of red. Also,

vehicles may be instructed to carry blue and yellow smoke grenades one day and green and red the next day.

At night, the colored smoke grenades won't do you any good, but you can use the M14 thermite grenade which produces an extremely bright light visible from altitudes up to 10,000 feet.

Pyrotechnics are also valuable signals at night, and the colored pyrotechnic signals can be used to good advantage during the day. Use the clearest and most easily recognized signals (red and white) for the most important meanings. One thing about pyrotechnics which I've already mentioned as applying to smoke—do not be miserly in their use. Don't use only one signal and expect that to do the job—use three or four, or maybe half a dozen. When a friendly airplane is droning around your head, brother, you don't take chances on his finding out that your intentions are honorable. You either prove to him pronto that you're friendly, or you get set to take the consequences.

Light signals are another means of identifying ground troops to planes. However, the signal lamp equipment issued to Infantry, the SE-11, is not too effective in signaling to planes by day because of its low intensity (5-cell flashlight). And, at night, it is satisfactory only if the plane is definitely located and the light properly aimed on it.

A word of warning here. It is important to remember that these visual signals identify and disclose the positions and front lines of ground units not only to friendly planes, but also to enemy planes and ground units in the vicinity. Therefore, visual signals are displayed only when permission to do so has been granted by higher authority and then only when absolutely necessary.

Now, Johnny, it's time for you to spring the prize question, "When do I get time to teach the use of these signaling devices in identifying ground troops to planes?" The answer is you should combine instruction in this subject with the tactical training of your unit.

The way we worked it out in our unit is as follows: When we reached the stage in our training when we were studying the tactics of the squad, platoon, and company, ar-

FIGURE 3.—Air missions against hostile ground units in the field of battle are the most difficult to control, the most expensive, and the least effective. For these reasons, these missions are lowest on the order of priority for missions of the tactical air force. However, their successful execution is essential to the combined air-ground effort. The P-51 shown above is strafing an enemy artillery position. In the Sicilian campaign, the A-36 fighter-bomber (the P-51 equipped with dive brakes and wing bomb racks) specialized in attacking such small but worthwhile targets as truck convoys, trains, tanks, and artillery.

rangements were made for the cooperation of several planes from a near-by Air Force unit. On certain days, these planes were given a detailed schedule of flights to make and missions to perform. Meanwhile, the division training program had been arranged and integrated so that as many units as possible received training in working with these friendly planes.

For instance, our company was marching along the road when a friendly plane flew over and signaled, "Display identification panels." As soon as we recognized the signal, which in this case was a green pyrotechnic, we displayed our panels at the head and rear of the column. Both we and the plane used the signal prescribed in the SOI drawn up especially for these problems.

Another time, our battalion was advancing against increasing enemy resistance and finally the umpire ruled that we could go no farther. We requested air support. Later, our airguards observed a friendly plane which signaled, "Mark your front lines." So, we displayed our panels and also used yellow smoke to mark our front lines.

Once when our company was in a bivouac area, a friendly plane flew over and fired a pyrotechnic signal meaning, "Are you friendly?" We immediately fired back a green pyrotechnic signal and set off green smoke grenades, both of which, in the current SOI, meant, "I am friendly."

So there you have the second phase of air-ground training. The third phase is the actual support of ground forces by aviation. Training in this phase should be carried on by means of combined air-ground operations with both air and ground organizations at as nearly normal strength as possible. This should take place both before and during maneuvers.

Before I close, Johnny, I want to tell you about two demonstrations we saw the other day. You'll be interested in them because you'll be seeing similar demonstrations later on. According to a directive from Headquarters Army Ground Forces, dated 29 May 1943, every division will witness a demonstration of an air attack by at least three modern tactical airplanes using live ammunition and bombs.

On the same day, the division will also witness a demonstration by a ground force unit firing live ammunition against a target on the ground and employing all weapons which might be used by that unit against low-flying airplanes. These demonstrations are to be held during the combined training period.

The first demonstration was staged by the air support party working with our division and was put on by planes of the air support command to which this air support party belonged. The planes used were B-25s, B-26s, and P-39s.

The demonstration was put on under an assumed tactical situation in which an Infantry division was attacking with two Infantry regiments abreast. The troops of one company were actually represented on the ground. The demonstration began with the division G-3 working on the next day's plan of attack with the commanding officer of the air support party with this divison. A strongly defended hill was located in the division zone of advance. Air support was believed necessary, so the G-3 and the ASP officer worked out detailed plans for air support. Request for the support was sent direct by radio to the air support command operating with the Army. Next, the division G-2 wanted some reconnaissance work done by the supporting aircraft. G-2 and the ASP officer worked out the details for this air reconnaissance. We then listened to a typical crew briefing before planes took off on the mission. The targets were designated by means of reference to a familiar landmark and by giving the azimuth and distance to the target. At H-hour, the front lines were marked for the friendly planes by using orange smoke grenades. The general trace of these lines was used as a bomb release line by the B-25s and B-26s which immediately delivered their incendiary and 100-pound demolition bombs on the enemy position. The bomb release or phase line must always either be definitely marked by panels, or by colored smoke as in the demonstration, or be an easily identifiable terrain feature such as a river, a road, or a forest clearing. After the bombing attack, P-39 fighter planes strafed the dummies representing enemy ground

troops. Immediately after the fighter attack, the ground troops rushed the enemy position.

During the demonstration, it was emphasized that the best air support objectives are normally found beyond the range of available friendly artillery. Our artillery causes the enemy to disperse and a dispersed objective is a poor target for air attack. However, in critical situations it is sometimes desirable to concentrate all available fire power upon a single objective. Therefore, support aviation must be capable of attacking targets within range of artillery.

The second demonstration was staged by men from one of the other regiments of our division. The targets were all located on a hillside. The weapons used in the demonstration included the M1903 and M1 rifles, the carbine, the B.A.R., the .50 caliber and .30 caliber light and heavy machine guns. Live ammunition was used, most of it being tracer bullets. All of us who saw this demonstration felt that the fire from well-trained ground force troops can often equal or exceed the fire power of attacking planes and that it would certainly raise Cain with low-flying airplanes.

Will have to close now, Johnny, as we have quite a bit of preparation to do in regard to our air-ground tests which our division is holding soon. I'll tell you about them in my next letter so you will be able to point your training toward them.

As ever,

Bill.

Dear Johnny,

You don't need to thank me for the "helpful points" which you say I've given you. Advice is the only thing you ever saw me give out gratis, isn't it?

Now for your question as to whether every division can expect to have an air support party operating with it. There

is no set rule on that. The air support component is elastic and is constantly being reshaped and re-formed to fit the individual situation. For official doctrine on how air power will be employed, you should consult the new Field Service Regulations, FM 100-20, Command and Employment of Air Power, approved 30 June 1943. You will note that this manual emphasizes that control of air power must be centralized, that command of air forces must be exercised through the air force commander operating under direction of the theater commander, and that air forces in any theater of operations must serve the theater and not be parceled out to subordinate commands.

If these three principles are adhered to, the inherent flexibility of air power will be most effectively utilized and the whole weight of the *available* air power can be concentrated against selected areas in turn.

In any theater of operations there will be one air force which will normally consist of a strategic air force, a tactical air force, an air defense command, and an air service command. It may also include troop carrier and photographic units. The tactical air force is the air unit which closely coordinates its activities with those of the ground forces. The tactical air force may contain reconnaissance aviation, light and medium bombardment units, fighter aviation, and an aircraft warning service.

In order to effect close coordination between the air and ground forces, pertinent commanders and staffs will get together for conferences and exchanges of views and information. In addition, air and ground liaison officers, well-versed in air and ground tactics, will be exchanged. Exact details regarding this exchange of air and ground liaison officers, as well as the specific organization of the component parts of the tactical air forces, will be governed by the requirements of the theater commander.

Although the tactical air force is the air component which works closely with ground troops, it will hardly ever attempt to provide an air umbrella for ground troops. An air umbrella is extremely expensive and could cover only a small area for a brief period. Air missions against hostile

units at the front receive the lowest rating on the order of priority for missions of the tactical air force. Here are the three phases of operation by a tactical air force in their correct order of priority:

(1) *Air superiority.* This is the primary aim of the tactical air force. An active fighter defense and offense is a prerequisite. Air superiority is obtained by bombing airdromes, by reducing the sources of supply of the enemy air force, and by destroying enemy planes at rest and on the wing. When air superiority is obtained, both air and ground forces can carry on the fight with little interference by enemy planes.

(2) *Isolation of the battlefield.* After air superiority has been obtained, the air force masses its attack on enemy lines of communication, supply dumps, installations, and hostile troop concentrations in rear areas. The successful completion of this second priority job of the air force will leave the enemy high and dry on the battlefield—without food, ammunition, and reinforcements.

(3) *Direct air support.* At the front, targets are small, dispersed, and difficult to locate. In addition, there is always a considerable chance of striking friendly ground troops because of errors in target designation, errors in navigation, or because of the fluidity of the situation. Consequently, missions against hostile units in the zone of action are the most expensive and least effective of all air missions. However, there are times when a commander will want to throw everything he has against a hostile objective. This type of mission is the supreme test of the effectiveness of the air-ground team. It demands teamwork, mutual understanding, coordination, and cooperation from both partners of the team.

It has been considered normal for an air force in a theater of operations to include an air support command. This air support command always consists of its headquarters and communication units; however, its assigned combat units depend upon the requirements of the commander in that specific theater of operations.

FIGURE 4.—Strategic bombardment, although unnoticed by the soldier on the battlefield, has such terrific and devastating effect upon the enemy that it must be considered as an invaluable form of air support. We do not see the Flying Fortresses bomb-ripping Hamburg nor witness the attack of the Mustangs on locomotives in Northern France, but months later, when the enemy's food supply is low and his ammunition is petering out, we reap the advantages of operations which initially did not seem to concern us.

It has also been considered normal for a typical air support command to operate with an Army (in the North African campaign an air support command worked with an army Corps), to include a commander and a staff who function alongside the commander and staff of that Army, and to include one or more groups of fighter and light or medium bombardment aviation, a signal battalion, and an air support control squadron. In this case, the air support commander's task is to execute the mission requested by the supported unit. To do this, he would be furnished with air support parties dispatched to the various units of the Army down to divisions and, where necessary, to combat teams or even smaller units.

Under this setup, whenever the Army desires an air mission, the commander calls on the air support command direct. When lower echelons require help from the air, their request is forwarded through normal command channels to units where there is an air support party.

A request approved by the unit which has an air support party working with it is forwarded to the air support command where the request is carefully considered in the light of the needs and demands of both the ground fighting and the air effort. Whenever other considerations permit, the air battle should be won first.

The ground unit requesting the support is informed of the decision made in regard to his request. If necessary, the air support party may be authorized to communicate direct with the supporting aircraft at the airdrome and while they are in flight on the requested mission.

There are two methods employed in effecting close support of the Infantry by friendly planes: preplanned missions and call missions. Generally, missions in close support of ground units are preplanned. That is, the ground commander and his staff meet periodically with the air commander and his staff to plan the combined operation. The activity of the air forces is coordinated to the requirements of the ground commander. After a study of G-2 and A-2 reports, reconnaissance aviation may be sent to reconnoiter important objectives. Then certain enemy tar-

gets are selected, the neutralization of which will have the greatest effect in helping the ground commander carry out his plan.

The other method of effecting close air support is the call mission. This is used when the local ground commanders ask for bombardment aviation to destroy unexpected ground targets which cannot be reached by artillery or to reinforce the artillery fires on a particularly strong part of the enemy's position. This is the most difficult type of mission to perform because of the time required to get the airplanes over the target, the difficulty in definitely locating targets from the air, the dispersed nature of targets in front lines which often makes bombing and strafing ineffective, and the danger that the planes and the ground troops will fire at and destroy each other. Successful performance of this type of mission requires careful air-ground coordination and training. Therefore, this type of mission may be stressed in your maneuvers and in the combined operations preceding maneuvers. If emphasis is placed on this type of mission, do not jump to the conclusion that this is more important than the preplanned mission. The call mission will be used only in an emergency, but we must be experienced in its use in order to take advantages of targets of opportunity.

If all preplanned missions have been carefully considered and selected, the need for call missions will be reduced to the minimum. By that I mean that if the G-2 and A-2 have been on the job, enemy strong points and reserves which might hold up the progress of our attack will already have been considered by the ground and air commanders, the front-line troops will have been told that air support will be sent at a certain time, and necessary instructions will have been issued for the identification of friendly front lines. Thus, air support may often be forthcoming even before front-line troops realize their need for it.

However, the tactical air force in every theater of operations might not be organized into air support parties and air support commands working with units of the ground

forces as I have just described. For instance, during the last stages of the North African campaign, the Allied air support commands were lumped together into the Northwest African Tactical Air Force. Brigadier General Laurence S. Kuter, American Deputy Commander under Air Marshal Coningham of the Northwest African Tactical Air Force, made public recently a first-hand account of the fall of Tunis and Bizerte in which he included the following references to this tactical air force:

"The concept of air-ground organization in the Tactical Air Force . . . can be traced back to June 1940, when the RAF could oppose a large, powerful and more modern Italian Air Force in Libya with only a handful of obsolete aircraft. This tiny RAF force not only held its own, but eventually swept to complete victory when General Wavell, now a Field Marshal, advanced for the first time across Cyrenaica.

"In that operation the Italian Air Force in Libya operated under the direct command of the Italian Ground Forces. The Italian Air Force consequently was used in penny packets at the order of local army commanders to give protection to their own local sectors. In contrast, the RAF, employed as a true air force and in concentrated mass, completely destroyed some eleven hundred Italian aircraft. . . .

"On February 18, when the Northwest African Air Force was formed, Air Marshal Coningham . . . was placed in command of all air forces fighting in the battle area alongside the armies. . . . The function of the tactical air force is one of working in partnership with other components of air power, with the strategical bombing force which uses the longest range bombers on relatively long-term targets, such as munitions establishments, supply ports, and the like. The tactical air force works with the coastal air force which is intent on cutting the enemy's supply route by sea and in protecting our own. The tactical air force is concerned with the battle itself immediately in the battle field. It is easy to say that such an air

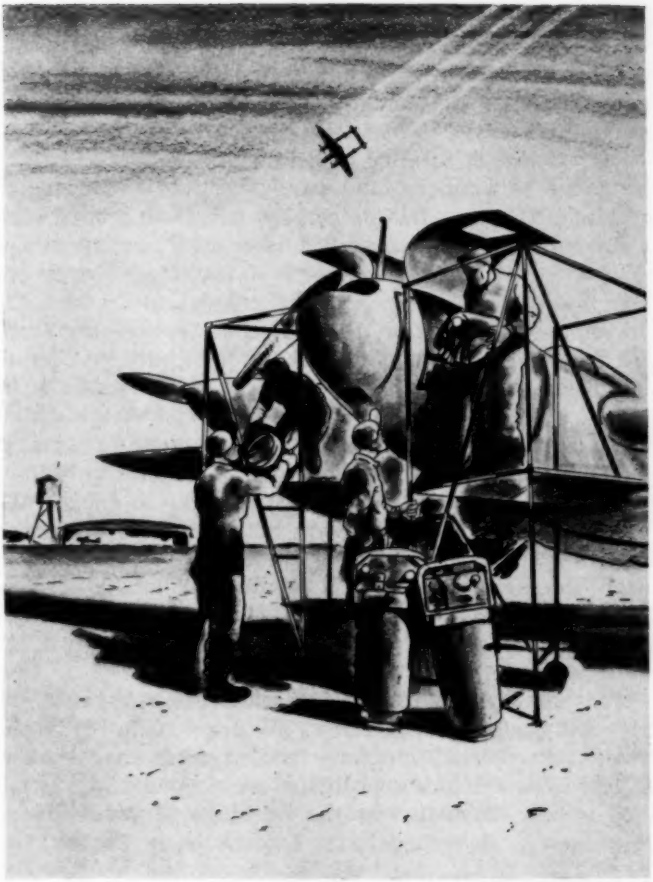


FIGURE 5.—Modern aerial observation is a science of swift planes and complicated cameras which serve to record, often in the darkest night, exactly what the enemy is doing. The process carried on by air support commands of obtaining information of enemy activities is constant and is invaluable to the establishment and maintenance of air superiority and the planning of air and ground action. Above is a ground crew loading cameras into the F-5A which is the P-38 fitted with cameras in its nose instead of guns. Small cameras are used for mapping surveys, big ones with long barrels are used for reconnaissance.

force gives air support to the army, but the word 'support' has now so many old-fashioned and wrong implications in the public mind that it is much better not to use it. The word 'support' always makes people think of air power used as an ancillary (auxiliary) weapon of the army or the navy; in operations which are primarily land or sea. It brings to mind a picture of bombing to extend the range of artillery, and particularly of squadrons of fighters at the immediate imperative call from ground commanders of relatively small sectors to attack enemy troops immediately in front of them or to defend their own troops from enemy bombers. . . . So this conception obscures the inevitable two phases of the modern battle—the air phase and the combined air-ground phase. The narrow conception of air support is firmly imbedded in the public mind and particularly in the mind of the inexperienced soldier who is having his first taste of enemy bombing or strafing. That method is precisely the method by which the Italians threw away their air force with no gains in Libya. Although it is the method by which the Germans advanced through France, when air opposition was very scant, it is surely the method which was found to be totally obsolete and leading more toward defeat than victory in operations against a well-trained army and a well-trained air force in Africa.

"It is much better to speak of *collaboration* between the army and the tactical air force. The army strikes from the ground, the tactical air force strikes from the air. The method by which this coordinated air-ground effort is applied is best illustrated by the workings in the combined air-ground headquarters in the battle area in Tunisia.

"In a tent camp in the Tunisian mountains, the air and ground commanders lived and worked side by side. . . . General Alexander controlled the land forces in the battle area. Air Marshal Coningham controlled the air forces in the battle area.

"The two commanders lived together in intimate daily consultation. They made their plans together, each stating what his force could contribute toward the general victory.

They worked in complete harmony. . . . General Alexander on his part moved his ground units steadily forward to capture and protect the air fields needed to tie down and then drive forward to capture the enemy. Air Marshal Coningham's effort was in two distinct phases. First, the requirement that he reduce the enemy air to practical impotence, and after that to throw the full weight of his air force against the enemy army. . . .

". . . Each day the Ground Operations officer presented in detail the previous 24 hours' operations on the ground, and the air operations officer presented the day in the air. The ground intelligence officer then presented his concept of the enemy's current situation on the ground and the air intelligence officer presented the enemy situation in the air, after which General Alexander and Air Marshal Coningham, or in his absence, his American deputy, discussed the immediate situation and future operations. . . . The Air Commander not infrequently pointed out specific locations on the front which would improve the air situation if captured.

"The Ground Commander would examine that particular location and if possible direct the Ground Forces to move on to those specific localities. In this manner, Ground Force support to air operations continually recurred. Similarly, the Ground Force commander would find the spot at which the ground effort had been hampered by the German air force. Normally the necessary movements were made and action taken by the air commander to further the effort on the ground in that particular location which was, in turn, air support of ground operations. This daily conference and its final result showed to very high order the soundness of the airman running the air war and the soldier running the ground war, but working coordinately and with striking success toward the same objective.

"This close teamwork by allies was not only in the air effort but in all operations of General Eisenhower's allied command."

(AIR FORCE, JULY 1943.)

After reading this account by General Kuter, you get a clearer idea of the implications and full meaning of the opening statement in FM 100-20 which says that land power and air power are coequal and interdependent forces. Neither is an auxiliary of the other and both must work together, each in its own zone, toward the same goal. This coordination and cooperation must begin with combined air-ground operations in this country, and continue through maneuvers so that by the time units from both components arrive in a theater of operations, they will be able to play their respective parts on the air-ground team.

And now for a little news about the air-ground tests. You'll remember, Johnny, that in my last letter I spoke about getting ready for air-ground tests. Well, our division just finished taking these tests and are now set for maneuvers where we'll get more training in air-ground combined operations.

These tests were devised by Headquarters Army Ground Forces, and whenever possible, are given ground force units just after they have completed the combined air-ground training period and just prior to maneuvers. The purpose of these tests, as stated by Hq, AGF, is to "insure proficiency of units by standardized tests graded so as to indicate proficiency in a reasonable degree and permit certain comparisons." They test the training already given a unit and also provide additional training in the technique and mechanics of air support. They don't cover staff planning or tactics which can be studied at schools or on maps, and although realism is emphasized in the conduct of the tests, unrealistics practices are sometimes necessary because the number of planes available for these tests is often limited. The planes used in our tests were the regular combat planes from our air support command. However, I understand that when these planes are not available, liaison type planes which might be available will be used. In addition, the necessary air support controls and parties may be simulated by the use of umpires.

There are four tests in this series:

1. Identification of friendly aircraft by ground troops.

2. Action of ground troops against hostile aircraft.
3. Identification of friendly troops to aircraft.
4. Air attack of targets designated by ground troops.

FIRST TEST

The purpose of the first test is to determine the ability of ground troops to identify common types of American aircraft. As you can imagine, it would take a lot of time and work to test every man within the division upon his ability to identify friendly aircraft, so the test is worked out on a selective basis. Within each company, one officer, two noncommissioned officers, and two privates were selected by drawing names from a hat just before the test. Each of these was required to identify the silhouettes of five planes selected at random from that list of planes which I gave you in my first letter.

By luck, I was the officer from our company selected to take the test. The personnel taking the test went into the company day room where we were shown models of five planes which, in our case, happened to be the P-39, P-51, B-25, B-24, and C-47. After all of our training in aircraft identification, none of us had any trouble at all in identifying these planes, so the company passed 100% on that test.

SECOND TEST

The second test was a phase of a controlled division field exercise. Its purpose was to stress aggressive action and passive defense by ground troops against hostile aircraft. The tests involved low-flying attacks by combat planes against various units on the march, in bivouac, and in position. Units were graded on the exercise in the following manner:

Active defensive measures	50%
Warning system	20%
Concealment	10%
Cover and protection	10%
Dispersion	10%

The units which were tested were selected by umpires so as to cause as little interference with the free play of

the exercise as possible. No unit knew where or when an attack would take place.

It happened that while our battalion was making an approach march on foot one afternoon, our air-antitank guards to the right flank noticed the approach of low-flying planes with enemy markings and gave the warning signal to the battalion. (Thus, we received the full credit of 20% for the maximum practicable warning under the situation.) The order was given to leave the road and simulate fire at the planes. Because several of the platoons in the battalion misunderstood the order and consequently did not develop the maximum possible amount of effective fire power, we received only 40% for our grade under active defensive measures. The dispersion of our men and vehicles, and the concealment, cover, and protection taken were judged fairly satisfactory and we received a grade of 25% for those three subdivisions of passive defensive measures. Our combined grade on this second test was 85%.

I heard that as a part of this second test our regimental CP was approached by planes which had friendly markings. The troops protecting the command post displayed panels and fired a pyrotechnic signal (I am friendly) in order to prevent further attack by those friendly planes. Thus, they received full credit for this test.

THIRD TEST

The third test, identification of friendly troops to aircraft, stressed the coordination and training necessary to enable air and friendly ground units to locate and recognize each other. This test required extensive use of air-ground visual signals so I was glad that we had received training in these and that the officers in our unit were familiar with the use of the SOI that was issued for these tests.

Both friendly and enemy planes were used in the test. Oh yes, I should tell you that the planes in all of the tests were marked as prescribed in par. 8*c*, FM 105-5, Umpire Manual.

The planes flew over ground units of the division which were on the march, in vehicles, in bivouac, deployed in position, and over command posts of the division and the regiments. The units tested were selected without warning by umpires. In all cases, the plane flew over the selected units and challenged the units to identify themselves or, in

FIGURE 6.—Colored smoke is one of the most effective means of ground-to-air signalling. It is especially valuable because it can be easily distinguished from the smoke normally present on the battlefield. Two colored smoke grenades recently standardized are the M16 (available in seven colors—red, orange, yellow, violet, green, blue, and black) and the AN, M3 which puts out a red smoke. The grenades are either thrown or placed at the desired location after the safety pin has been pulled. The grenades burn for about two minutes and twenty seconds. The smoke is visible from altitudes as high as 10,000 feet.

some cases, to mark their front lines. For signaling purposes, the planes used pyrotechnic signals while the ground units used panels, pyrotechnics, and colored smoke grenades. Air umpires reported the position and description of the ground units on a map or, in some cases, by radio.

Our company did not happen to be selected to take part in this test, but Company "B" in our regiment was tested

marching along a road. A friendly plane flew over and fired a pyrotechnic signal meaning, "Are you friendly?" Immediately, the company commander directed that panels be displayed at the head and tail of the column. These signals were prescribed by the current SOI. In another case I know of, which took place at night, the friendly plane fired a white pyrotechnic signal meaning "Mark front lines." The ground unit replied by setting off M14 thermite grenades which made a brilliant light.

FOURTH TEST

The fourth test, air attack of targets designated by friendly ground troops, emphasized the coordination and training necessary to enable friendly planes to attack targets, particularly close-in targets of opportunity, designated by ground troops. This direct, close-in support was stressed even though it might not often be used, because this is the most difficult type of support to execute promptly and effectively and, therefore, must be practiced during combined training and maneuver periods.

The test involved the entire division in a field maneuver. Both hostile and friendly planes were used, marked in the same way as they were in the other tests. When the planes attacked targets, live and practice bombs were used. The tests included the following air support missions by friendly planes:

1. Bombardment of two targets before the ground attack began. These targets were designated by division and consisted of a bridge and a troop bivouac area, the type of targets which can be foreseen some time before the attack.
2. Bombardment of one target after the attack started. This target, another troop bivouac area, was also of the type which can be foreseen prior to the attack and was designated by division.
3. Bombardment of three targets during the attack. Two of these targets were attacked by planes which were on air alert at the time the call for support came through. One of these targets was designated by our battalion, to which an air support party had been attached for the field

problem. One of the other targets was designated by a regiment, and the third by the division.

Friendly troops were in contact with each of the targets designated. The target which our battalion designated was a hill from which enemy artillery fire was holding up the advance of our battalion. No artillery support was available, so our battalion commander requested help from the air support party attached to our battalion. A detailed description of the location and type of target was given. The air support party commander approved the request and sent it on by radio to the air support control located at division. In order to facilitate the movement of the problem, the planes at division were on air alert and knew the initial situation. However, they did not know the location or nature of the target.

As they proceeded toward the target, radio contact was maintained between these friendly planes and the air support party commander. Near the battalion CP, signal panels were displayed indicating the direction and distance to the targets. Colored smoke was used to attract the pilot's attention to the panels. As the planes flew over our unit, they signaled for us to mark our front lines, which we did by using smoke grenades. The attack went off successfully.

The reason I spent so much time telling you about these tests, Johnny, is that your unit undoubtedly will have them later on—just before you go on maneuvers—so you'll want to conduct your entire training in air-ground with these tests in mind.

And now to summarize a few points about the whole subject of air-ground:

1. *Importance.* It is not the only subject in which you will have to become proficient, but it is among the most important. One look at the North African campaign—at the fatal mistakes in identification and recognition on the part of both ground troops and airmen, at the delays and ineffective coordination caused by a lack of understanding of the basic problems faced by each member of the air-ground team, and at the smashing and sensational results when an

air-ground team really functioned—and you'll realize how vital and necessary is effective instruction in this subject.

2. *Many-sidedness.* The subject is large and includes several subdivisions or separate phases—all of which require careful training and constant practice in order to achieve proficiency.

3. *Interest-appeal.* It is a fascinating subject, one in which your men are naturally interested and which they will learn quickly. You'll find this factor compensates partially for the comparatively small amount of time allotted this subject in training programs.

4. *Newness.* The subject is brand-new. Most of its tactics and strategy are still in the formative stage. For example, the organization which General Kuter described was an innovation, used for the first time in the North African campaign and later in the Battle of Sicily. New experiments in organization doubtless will follow. But don't let that bother you. When you get into your theater of operations, it won't make much difference to you whether your air support comes in the familiar packages of air support parties and air control parties working with the divisions, corps, and armies, or whether you get it in an entirely different form, especially if it packs as powerful a wallop as the Northwest African Tactical Air Force.

We have a big job before us. Or rather, a lot of different jobs. Commanders of large ground forces will be concerned with the strategy and the tactics of employing supporting air power. They must be able to decide quickly and often whether planes should be sent out against distant targets or be directed in close support action. Subordinate commanders will be required to become expert in combined air-ground operations. Leaders of small units must know how to identify their units to friendly planes and mark their front lines at a moment's notice, and they must be able to spot enemy planes in time to give warning of the impending attack. Signal operation instructions and standing operating procedure of all units down to the platoons must be coordinated with those of the air units, so

the air-ground team will not be burdened with a thousand and one varieties of complicated signals. It's going to take a lot of careful planning, hard work, and constant training on the part of ground troops to hold down their place on the air-ground team. But, it can be done, and I think we're just the men who can help do it.

Good luck to you,

Bill.

CHAPTER 2

Combat Firing Proficiency Test For The Rifle Platoon

An Army Ground Force training directive, dated 19 October 1942, and effective 1 November 1942, includes the provision that by means of combat firing proficiency tests all platoons of the rifle and heavy weapons companies in the infantry regiment will be tested by the division commander during the unit-training phase. The purpose of the test is implied in its name, and the type of problem used in conducting the test should be designed to emphasize leadership and team play. A score of 70% or above is required for a satisfactory rating.

The test not only affords the higher commander an opportunity to view the platoon in action, but satisfactory completion gives added confidence to the leader and personnel of the tested platoon. This confidence is directly related to battle conduct and it is essential that it be gained during the training period. The responsibility of the platoon leader, and the company commander as well, is self-evident, and the combat firing proficiency test is a measure of the preparedness of the leaders and the unit for combat.

It is important that officers assigned to umpire these tests fully acquaint themselves with the conditions and requirements of the directive for the test, for upon their shoulders will rest the responsibility of appraising the proficiency of the unit being tested.

The controlling directive specifies that the test for a rifle platoon will be given in the form of an attack problem involving fire and maneuver, with the tested platoon acting as an exterior unit, initially advancing in approach march formation and subsequently engaging in a coordinated attack.

The directive also prescribes an ammunition allowance of 16 rounds for each rifleman and 40 rounds for each automatic rifleman, these amounts to be reserved from the annual allowance.

While the weapons platoon is not tested simultaneously with the rifle platoon, elements of it participate in the problem and a minimum of one 60-mm mortar will fire during the attack phase.

In the conduct of the test, there should be a minimum of one chief umpire and an umpire for each element of the tested platoon; that is, one umpire for the platoon headquarters and one for each squad. In addition, an umpire should be assigned to the elements of the participating weapons platoon. One or more assistant umpires should be available for use in any situation which may arise. If sufficient officers are not available, selected noncommissioned officers may be used as umpires.

The range used for rifle platoon combat firing proficiency tests at The Infantry School is simple in layout and operation. The sketch shown herewith (figure 7) is a schematic adaptation of the relative locations of firing positions, targets, and target control pit on this range, and provides a basic plan which can be adapted to any training area in which such a test may be conducted. If possible, the range employed should have a sector of fire of 200 degrees, sufficient to permit the maneuvering element of the tested platoon to deliver fire from either flank of the enemy position. A sector of fire of this width will not be available at all training camps, and in such cases it will be necessary to adapt the problem to the most suitable range facilities that are available. Sectors of fire which are wide enough to permit the delivering of flanking fire from one flank will suffice for a problem within the scope of the directive. When the problem must be limited by any of these restrictions in range facilities, conditions should be written into the assumed tactical situation which will lend realism to the limitations. If simulated dispositions of either friendly

or hostile troops, gassed areas, areas under artillery bombardment, or other tactical conditions are assumed for the purpose of so delimiting the problem, the areas involved should be indicated by flags or other markers.

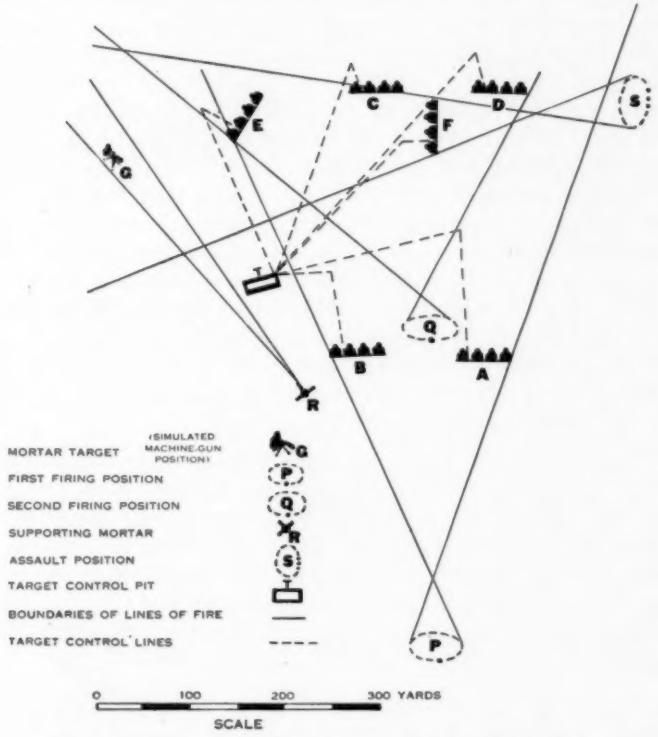


FIGURE 7.—Schematic diagram showing relative locations of firing positions, targets and target control pit for the range indicated in figure 10.

Figures 8 and 9 show details of installations and expedients which have been tested and found satisfactory. Although reduced to the simplest forms, these devices nevertheless have proved equal to the demands upon them during many months of actual use. The control lines for the targets may be of wire, cable, or clothesline. A few

anchor pickets of the kind used for barbed wire entanglements can be used instead of pulleys as guides for the control lines. They should be screwed into the ground until the eye is almost down to ground level, and the line run through the eye. If metal anchor pickets are not available, wooden stakes with small pulleys fastened to them or large staples driven into them will work equally well. The target support frames are easily constructed of salvage lumber. (See figure 8 for details of construction.) It is a waste of time and materials to employ good lumber and fine carpentry in constructing the target frames since in the course of use they will be splintered by bullets and will require frequent patching and replacing. The maximum distance possible from targets to the target control pit will be governed by local conditions such as the nature of the terrain, the material used for target control lines, and the personnel available to operate the targets. By careful location of targets and target control pit, it will often be found that the targets of two successive platoon objectives can be operated from one pit.

The control pit should be carefully made and adequately banked. It must be covered and have as small an entrance as practicable. The entrance should be on the side away from the principal firing line. The control pit may also be protected with an offset entrance of bags of sand, particularly on the side from which flanking fire is delivered. Construction can be kept to a minimum by placing the shelter as much below ground as possible.

The supporting mortar fires should be directed at targets other than those upon which the tested platoon will fire. Otherwise they will destroy the accuracy of the scoring of the tested platoon.

The situations presented by the test and by the duties of umpiring are concrete problems. There are no general rules which will fit every one of the situations that might arise. There are no general terms in which the detailed operation of the specific individual test may be described. Even on the same terrain, with the same problem presented,

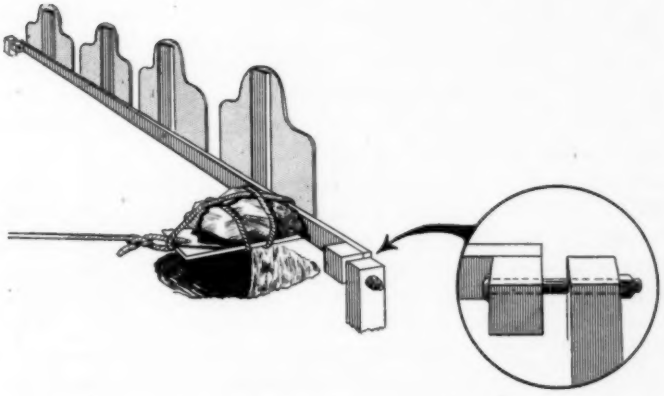


FIGURE 8.—Disappearing targets may be easily made as indicated. Release of the control line causes the weight to fall into the hole, and turn the targets to a horizontal, concealed position. Inset shows detail of construction of the pivots at each end of the line of targets.

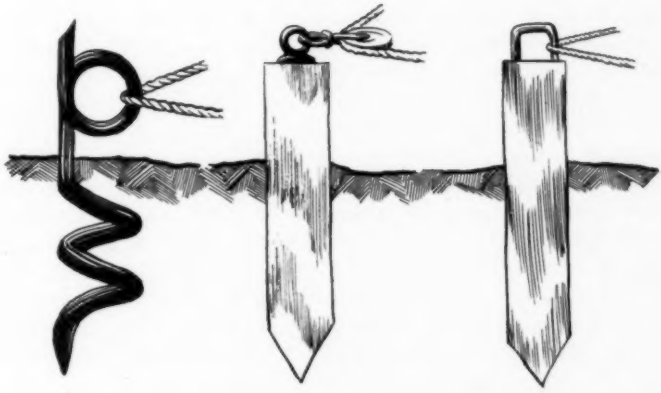


FIGURE 9.—Improvised guides for target control lines may be made from anchor pickets, by fastening a pulley to a wooden stake in the ground, or by a large staple driven into the end of such a stake.

no two tests will set identical patterns. However, we do have principles that apply and serve as source and basis for the concrete application. These principles must be mastered, and the typical manner of application—the technique of converting general principle into specific application—must be understood.

To help in gaining this understanding, a problem is presented here in the form of a running account of a specific combat firing proficiency test for a rifle platoon. It shows how one chief umpire and one platoon leader accomplished the job of adapting the general principles to appropriate action in a concrete situation. The leader's orders, the actions of the tested personnel, and the remarks of the umpire are typical. The value of the document is as an illustrative example, not as a precise guide or detailed model.

Throughout the test the chief umpire is in charge of the assistant umpires, the telephone operators, and a range officer who manages the pit detail and range guards. He should arrive at the range with this group at least two hours before the time scheduled for the combat firing proficiency test. The targets and operating mechanisms are checked and tested and any necessary minor repairs are made. A sound-powered telephone line is run from the pit shelter to a point behind the first firing positions and a telephone operator is posted at each end of the line. All equipment which will be used during the test should be checked before the tested platoon arrives. Range guards are posted and the range flag raised. The umpires and men in charge of the ammunition then go to the point where the problem is to be initiated.

In starting the problem, the chief umpire plays the role of the company commander of the company of which the tested platoon is a part. The platoon is instructed to report at a point sufficiently in rear of the range to allow an advance of at least one-half mile in approach march formation. Here the platoon is oriented to the extent of the matter covered in the situation as given below and ammunition is distributed.

The chief umpire then initiates the problem as follows (see figure 10):

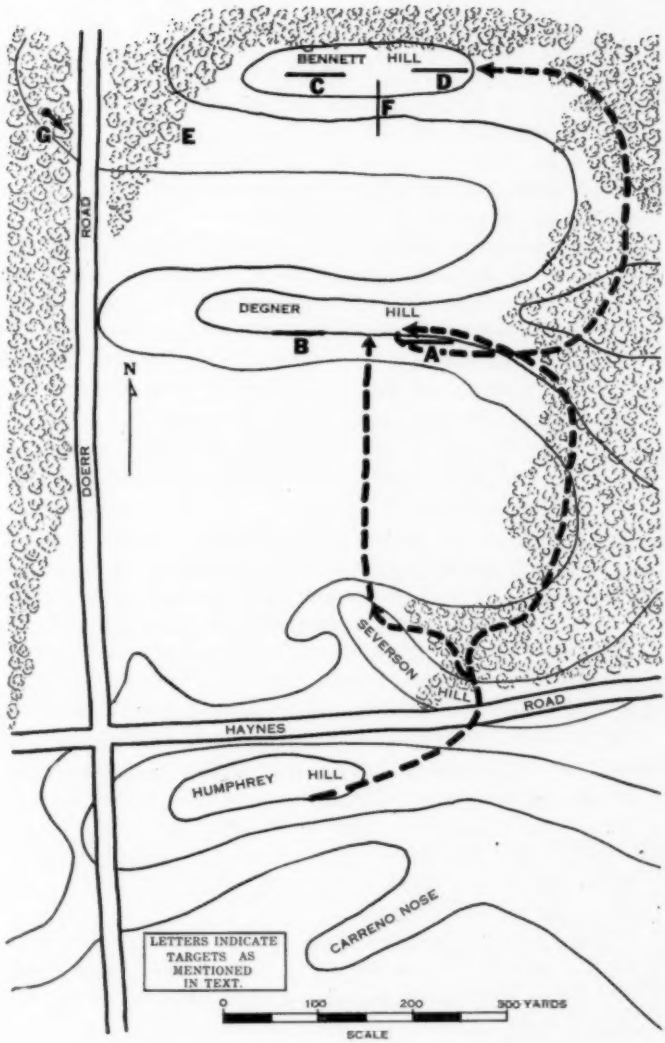

BENNETT HILL
C
D
F
G
E
ROAD
DOERR
DEGNER HILL
B
A
N
SEVERSON HILL
ROAD
HAYNES
HUMPHREY HILL
CARRENO NOSE
LETTERS INDICATE TARGETS AS MENTIONED IN TEXT.
0 100 200 300 YARDS
SCALE

FIGURE 10.

Chief Umpire: Company E, an exterior unit, part of a larger force, is advancing north in approach march formation, reconnoitering a zone extending several hundred yards east and west of DOERR ROAD. The advance has been slowed up by intermittent artillery fire and hostile air reconnaissance. At this time the leading platoons are advancing to the north and are now about one-half mile south of HAYNES ROAD. Contact with enemy delaying elements is imminent.

The company objective is DEGNER HILL and the platoon leaders are to report to the company commander on arrival there. The 2d Platoon, base platoon (simulated) is reconnoitering the left (west) zone; the 1st Platoon (simulated), in support, is advancing behind the 3d Platoon, the platoon which is being tested. The 3d Platoon, on the right, is in formation appropriate for a unit on an exposed flank, this formation including, by order of the company commander, a flank patrol of at least one-half squad.

Lieutenant 3d Platoon, the problem is now started. In five minutes the situation will become tactical. By that time you will have your unit, including the flank patrol, properly disposed and moving forward. You do not need to orient your men since the situation has been explained to the entire unit. Your decisions and actions and the actions of your men will be graded from this time until I conclude the problem.

Lieutenant 3d Platoon: (to his unit leaders) We advance to the north, reconnoitering a zone 500 yards east of that road (pointing). Our first objective is HAYNES ROAD. We will move out in a line of squad columns echeloned to the right rear in order 1st, 2d, 3d Squads, 50 yards between squads.

Corporal Kilgore (assistant squad leader), take one-half of the 3d Squad including the automatic-rifle team and move 200 yards to the east and abreast of the 1st Squad, and protect our right flank. When you reach HAYNES ROAD one-half mile from here, post your patrol and report to me just south of the road. Ser-

geant Kennett (platoon sergeant), you will be in charge of the squads. Send the scouts of the 1st and 2d Squads to me here. I will move the scouts out in front of the 1st and 2d Squads about 500 yards and will be in the center of the interval between them. Keep in touch with me. Any questions?

(The platoons move forward in the above formation. When the scouts reach HAYNES ROAD, they halt in positions from which they can observe to the front. The platoon leader halts the platoon behind HUMPHREY HILL and signals for the leaders to report to him. When the corporal of the 3d Squad [Corporal Kilgore] reports, he issues the following order:)

That hill about 500 yards to the front (pointing) is DEGNER HILL, our next objective. Corporal Kilgore, move your patrol north and keep about 200 yards within the edge of those woods (pointing to the woods to the northeast). Use a connecting group and keep abreast of the scouts. I am going to move the 1st Squad scouts across the open ground to DEGNER HILL and the 2d Squad scouts in the edge of those woods (pointing). Corporal Kilgore, move your patrol out as soon as you rejoin it. Sergeant Kennett, watch me for signals and when I signal you forward, move the platoon in column about 50 yards inside those woods (pointing) and stay 150 yards in rear of me.

Any questions?

Let's go.

(The scouts move toward DEGNER HILL. When they are about 100 yards out, or as soon as the platoon has approached the crest of SEVERSON HILL, the chief umpire has the telephone operator notify the pit detail to expose Targets A and B and to set off firecrackers, simulating enemy rifle-fire upon the scouts. The chief umpire announces that this fire is coming from an enemy group estimated to be one-half squad of riflemen, as represented by the targets. The scouts take cover and open fire, outlining the hostile positions by means of tracer ammunition. Lieu-

tenant 3d Platoon quickly rejoins the platoon and issues the following order:)

"Sergeant Hubbard, deploy your 1st Squad and open fire. I will take the 2d and 3d Squads through the woods on the right, and prepare to attack the enemy's left flank. I will give an arm-and-hand signal from the edge of the woods when we are ready to assault. Cease fire when you get that signal."

(Lieutenant 3d Platoon promptly moves off with the 2d and 3d Squads.)

Sergeant Hubbard, 1st Squad: (makes a rapid reconnaissance of the area to his front, and returns to his squad) Range 300. Move to positions where you can just see over the crest of this hill.

BAR team . . . .

Hansen and Jones . . . .

Jenkins and Hearn . . . .

Heggen . . . .

Front. Enemy position on next ridge. Watch scouts' tracers . . . . Commence firing.

(The men creep into position as their names are called and open fire. The scouts of the 1st Squad continue firing. The two noncommissioned officers of the 1st Squad move back and forth behind the line, observing and adjusting the fire of individual riflemen. The umpire with the 1st Squad also moves back and forth behind the crest of the ridge, checking the accuracy and distribution of fire and the movements and positions of the men and the control maintained by the noncommissioned officers.

(The enemy on DEGNER HILL withdraws after a few rounds have been fired. This is simulated by the lowering of Targets A and B on order of the chief umpire transmitted through the telephone operator to the pit detail. The umpire explains the meaning of this lowering of the targets to the squad leader of the 1st Squad. The scouts of the 2d Squad advance to DEGNER HILL without encountering further enemy fire.)

Messenger: (reporting to Sergeant 1st Squad from Lieutenant 3d Platoon) The enemy has retreated from DEG-

NER HILL and we are moving through the woods to that hill. Bring your squad to the near slope of DEGNER HILL and join Lieutenant 3d Platoon there.

(Sergeant 1st Squad gives the order to cease firing, moves in front of his squad and signals "forward." The squad moves out. All units of the 3d Platoon assemble along the southern slope of DEGNER HILL.)

Lieutenant 3d Platoon: Sergeant Kennett (platoon sergeant), as previously ordered I'm going to meet the company commander near that road (pointing to DOERR ROAD). See that the men are dispersed and post the scouts of the 1st and 2d Squads, as local security. Stay behind the hill here but keep a sharp lookout to the front. Be sure you keep contact with Corporal Kilgore's patrol protecting our right flank. If any men are short of ammunition, even things up.

(Lieutenant 3d Platoon moves to the road at the western end of DEGNER HILL where he reports to his company commander [the chief umpire] and receives this fragmentary order.)

Captain Company E: There is strong resistance to our front from enemy on BENNETT HILL. The 2d Platoon has advanced through the woods to the west and is now at least 200 yards north of BENNETT HILL. The 1st Platoon, in support, is south of HUMPHREY HILL. The Weapons Platoon will support the attack with mortar fire from positions in this vicinity; their observers are near the crest of DEGNER HILL. You will attack and capture the enemy positions on BENNETT HILL. Signals for supporting fires to cease: red Very signal and arm-and-hand. I will be here.

Any questions?

Move out.

(To outline and simulate the enemy resistance on BENNETT HILL, the chief umpire has the telephone operator instruct the pit detail to expose Targets C and D. Lieutenant 3d Platoon returns to a point where he can observe the area north of DEGNER HILL, and makes a visual reconnaissance. He drops back below the crest of the hill

and signals his leaders to join him. When the leaders have assembled, the group moves far enough forward to see the area to the north.)

Lieutenant 3d Platoon: Harper (messenger), go through the woods to our right and find Corporal Kilgore. Tell him to move his patrol to the north edge of those woods just east of BENNETT HILL (pointing) and take up positions to protect our right flank. They are to wait there for further orders. Repeat.

Messenger: I am to find Corporal Kilgore on our right, tell him to move north to the edge of those woods, take up positions to protect our flank and to await orders there.

Lieutenant 3d Platoon: Right. Move out. (Turning to his subordinate leaders.) The enemy is on BENNETT HILL (pointing). The platoon on our left has advanced to a point 200 yards north of BENNETT HILL. We will attack and capture the hill. Sergeant Hubbard, move your (1st) squad into firing position near the crest of this hill and fire on the enemy in position. Sergeant Kennett (platoon sergeant), you will be in command here. 2d and 3d Squads, follow me. We will assault the enemy left flank from that point of woods (pointing to the northeast). Sergeant Kennett, watch for my signal from the edge of those woods (pointing): a red Very signal and an arm-and-hand signal. When you get it, all fires from this hill will cease. Pass the signal on to that (pointing) mortar observer.

Any questions?

Let's go.

(Lieutenant 3d Platoon signals for the local security to withdraw behind DEGNER HILL as the 1st Squad moves into position. This squad immediately opens the fire fight on Targets C and D. The chief umpire directs the assistant umpire with the 1st Squad to order the exposing and lowering of the surprise target [Target E] and the assault-fire target [Target F] at the proper times. The chief umpire accompanies the maneuvering element [2d and 3d Squads].

(While the 1st Squad engages the enemy with the object of keeping him pinned down, the platoon, less detachments, advances through the woods on the right flank. Formation: squad column with scouts of 2d and 3d Squads out, followed by Lieutenant 3d Platoon, the 2d Squad, the 3d Squad and the platoon guide. For about 150 yards, this maneuvering element moves through fairly dense woods. They then reach a clearing approximately ten yards wide. The scouts and Lieutenant 3d Platoon cross this clearing. The leading men of the 2d Squad start to cross and Lieutenant 3d Platoon signals for the remainder of the men to double time. The formation then continues forward until they reach the point of the woods opposite the crest of BENNETT HILL.

(During this advance the assistant umpire with the 1st Squad has the telephone operator instruct the pit detail to expose Target E. He watches closely, with particular attention to the automatic rifleman of the 1st Squad to see how promptly this surprise target is engaged by the 1st Squad. In the meantime, the mortar squad fires on previously designated targets [such as G, figure 7] other than those of the tested platoon.

(Near the point of the woods, Lieutenant 3d Platoon stops while the men continue past him, then signals to them, "left flank" and "halt." He moves cautiously to the edge of the woods, and makes a brief visual reconnaissance. He then fires a red Very signal and gives the arm-and-hand signal for "cease firing," preparatory to the assault. Immediately upon seeing either of these signals, the assistant umpire with the 1st Squad, through the telephone operator, orders Target F exposed, while the platoon sergeant and the mortar squad leader give the order to cease fire.

(As soon as these fires have ceased, the maneuvering element, on order or signal from Lieutenant 3d Platoon, assaults the enemy position, delivering assault fire on Target F as they advance, and finally rushes the position. To signify that the position has been reduced, all targets are

lowered at the appropriate moment on order of the assistant umpire who is with the 1st Squad.

(At this point the problem is ended. Lieutenant 3d Platoon sends his messenger to bring in Corporal Kilgore's security patrol. Arms are inspected and the platoon is moved to DEGNER HILL. The pit detail, under supervision of the assistant umpire who was with the 1st Squad, scores all targets and when this task is completed, moves back to DEGNER HILL.

(All unexpended ammunition is turned in, counted, and checked off in accordance with the method prescribed for scoring the test. The chief umpire confers with the assistant umpires, questioning them on all points observed which should be brought up in the critique. He may either call on the assistant umpires for their remarks before he delivers his own, or he may incorporate their observations in his own remarks. A chart reproduction of the combat firing proficiency test score sheet [see figures 11 and 12], large enough to be seen by all members of the platoon and used in recording the scores, will assist in discussing the test and will act as an interest stimulator for the men. It should be provided with spaces for marking down the figures in chalk or heavy crayon. The score sheet may be copied on a blackboard for this purpose.

(When all men have been assembled, the chief umpire delivers a critique of the execution of the test. He then proceeds to the actual scoring of the test, basing his comments and score upon points mentioned in the critique.)

Chief Umpire: We will discuss the execution of this problem and calculate the score of this platoon. Remember, it takes a score of 70 per cent for a satisfactory rating. I'm going to follow through on this score sheet so you'll all be able to see just what sort of a job you did.

I have no way of knowing whether the platoon leader planned his reconnaissances. It appeared that he did. I noticed that each time a reconnaissance seemed necessary, he seemed to pause as though he were thinking about what he was going to do, and also each time he made a reconnaissance, he seemed to

go about it in an unhesitating manner as though he knew just where he was going and what he was going to do. There was one time when he made an insufficient reconnaissance, and I would like to know why. Platoon leader, when you were on DEGNER HILL, and were anticipating your final assault, what was your plan of reconnaissance? I noticed that you made a visual reconnaissance, but no ground reconnaissance.

Platoon Leader: Yes, sir, I decided first to make a visual reconnaissance, and depending on what I could see, to make a more thorough reconnaissance if I decided there was enough time and it seemed necessary. I felt that my visual reconnaissance was sufficient so I made no ground reconnaissance.

Chief Umpire: Apparently then, you had a plan, so you will get full credit on that point. But in this case a visual reconnaissance was not enough. I will show you later where you made an error that would have caused casualties, and which you would not have made if you had actually gone into the edge of the woods on the right flank as far as you safely could, and looked ahead. I am going to cut you one-fifth for that error in execution of reconnaissance and give you four points for the reconnaissance item. Decisions and control, for the most part were good. Control of the 1st Squad, in particular was excellent. Back on SEVERSON HILL, when the 1st Squad was designated as the base of fire squad, the BAR moved up first and the rest of the squad moved into position one or two men at a time, as called by the squad leader. The umpire with the flank patrol reports that the connecting group was out of position and for a short time contact with the rest of the platoon was lost. The patrol leader (Corporal Kilgore) decided immediately what to do, and contact was re-established before any damage was done. That loss of control, however, cost one point on the final score. The platoon's score for decision and control then is four points.

SCORE SHEET FOR COMBAT FIRING PROFICIENCY TEST

A. *TACTICS* (Total Weight 35)		
1. TROOP LEADING	*Weight*	*Score*
a. Reconnaissance (plan and execution)	5	———
b. Decision and control	5	———
c. Time required to make decisions, formulate plans and issue orders	5	———
d. Brevity, clearness and practicability of orders	5	———
Total	20	———
2. EXECUTION BY UNIT AS A WHOLE		
a. Formations of unit	3	———
b. Speed of execution of orders	3	———
c. General character of execution	3	———
d. Use of flanking fire	3	———
e. Prompt engagements of surprise targets	3	———
Total	15	———

B. *TECHNIQUE* (Total Weight 35)	*Weight*	*Score*
1. Use of cover	12	———
2. Conduct of individuals in maintaining proper formations	3	———
3. Technique of movements	4	———
4. Fire control	8	———
5. Distribution of fire	8	———
Total	35	———

FIGURE 11.—Score sheet for Combat Firing Proficiency Test.

C. *EFFECTIVENESS OF FIRE* (Total Weight 30)

1. Number of targets hit 20

$$\% \text{ of targets hit: } \frac{\text{number of targets hit}}{\text{number of targets}}$$

Score = % of targets hit x 20 (total weight) ———

2. Number of hits on all targets 10

$$\% \text{ of hits: } \frac{\text{number of hits}}{\text{number of rounds issued—number of rounds not fired}}$$

Score = % of hits x 10 (total weight) ———

Total..... 30 ———

TOTAL SCORE FOR TEST:

A. ————

B. ————

C. ————

Total ————

———————————
Signature of Scoring Officer

———————————

Satisfactory Rating: 70% and above.

FIGURE 12.—Score sheet *(continued)*.

As to the time element, the important point is not whether the entire exercise was performed quickly and rapidly. Instead, it is a question of whether each decision was made and each order issued in the minimum time commensurate with the situation. In many cases the tactical situation will dictate slow movement, but the prompt decision and execution of that movement is the point under consideration here. In the problem today, all leaders made quick, sound decisions, and the troops executed them very promptly. Full credit of five points on that.

There are three parts under the next item. Brevity; the orders certainly had that. Clearness; the test of that is whether the men were able to follow them. In general, all units complied properly with orders. When the platoon leader first established the flank patrol, his instructions to the patrol leader included the following statement; "When you reach a road a half mile from here, post your patrol and report to me just south of the road." That was not a definite point at which the patrol leader was to report. The result was that the patrol leader had a little difficulty in finding the platoon leader. For that lack of clarity, I am going to cut the platoon one point. Practicability; the plan certainly went through. There is no doubt you would have accomplished your mission. Total points on this item, then, is four.

The platoon lost 3 points under "troop leading," 17 points out of 20.

The formations generally were good. During the approach march phase, however, the 2d Squad kept bunching up. The squad leader and assistant squad leader both saw what was happening and several times corrected this error. As the squad moved along, however, the men would again close their intervals and distances. Their leaders corrected this three different times, before the men finally stayed in a good formation. I am going to cut the platoon one point for the poor forma-

tion of that squad during the approach march. Total points for formations; two.

Speed of execution of orders: Orders were promptly executed except in one case. When the maneuvering unit moved forward from behind DEGNER HILL, the 3d Squad was slow in getting started. The 2d Squad moved out immediately behind the platoon leader, and the 3d Squad was slow enough that they had to double-time in order to catch up, and the 2d Squad had to wait a minute or so for them. That slowness to respond to the order cost the platoon one point, so for speed of execution of orders, the platoon gets two points.

General character of the execution is really a bonus item, to be won or lost by your general conduct. Regardless of skill or efficiency, when every one is really trying—when men go through the test with enthusiasm and spirit—they earn these three points. If they lie down on the job, go along half-heartedly, they are cut. In the test today, it appeared that every one was really trying all the time. I'm going to give you the three bonus points.

Now for the use of flanking fire. When the 1st Squad deployed on DEGNER HILL and provided the base of fire for the rest of the platoon, they had no chance to employ flanking fire. They were right in front of the enemy. But the maneuvering element, when they made their final assault, had a chance to use flanking fire and they did use it. The effect of their fire will be scored later, but the question here is whether flanking fire was used. Sometimes there is a tendency for the maneuvering element to oblique in, to cut over at an angle before moving all the way back to a point opposite and in extension of the line of the enemy position. This results in oblique fire instead of flanking fire, and is much less effective. You didn't do that in this case. You went all the way back and came right in on the flank. Full credit, three points.

Prompt engagement of surprise targets: There was a good BAR target that came up during the test. The

target was located right over there (pointing toward target E). (See figure 10.) It came up while the 1st Squad was firing on the enemy position there (pointing) and the rest of the platoon was maneuvering through the woods to the east (pointing). The umpire with the 1st Squad knew it was about time for that target to come up, but says he was watching something else at the moment. He says he had looked away for only a moment and by the time he turned around the BAR was already on that target. That was prompt engagement. In general, the entire platoon seemed alert in a similar manner, so I'll allow full credit for that.

That gives you 13 out of a possible 15 for "execution." And 30 points out of the 35 allowed altogether under "tactics."

Now under "technique," you see how much weight is given to the use of cover. That is important. For you can be the best trained outfit in the world in everything else and if you don't make the best use of cover when bullets are whistling through the air at you, somebody will have to find a whole new unit to hold the position where you were a minute before. On the whole the use of cover by individuals today was excellent. There were a couple of instances, however, where it was not so good. When the squad leader of the 1st Squad went up to look over the top of the crest on DEGNER HILL, he crawled up very well. But when he went back, he wriggled back a little way, apparently thought he was far enough below the crest, then jumped up and ran the rest of the way back. He wasn't far enough. After that the assistant squad leader would probably have had a chance to show what he could do in running the squad. The second example was more serious, and is the error I mentioned a while ago and which would not have happened if the platoon leader had made a thorough reconnaissance. It happened out in the woods on the flank. The platoon leader didn't know it when he started out, but there is a good clearing for a field

of fire in the woods up there about 150 yards. It's a narrow space that's pretty well open. When the maneuvering element came out into it they were in a column; the men were pretty close together, and they were a fine target for a minute, and right where the enemy had an excellent field of fire. Then the platoon leader signaled "double time," but that signal was pretty late. But regardless of when the signal was given, the formation was defective. So I'm going to cut you four points, and give you only eight on the use of cover, because of these errors.

Formations were well chosen. The scouts functioned well and at proper distance and interval. The element in the woods moved in proper formation for maintaining control in going through the woods. The flank patrol used good formations and took up a good position to protect the flank when they reached the objective. Full three points credit there.

Movements were good too. The men crept well, cradled their rifles properly, in coming up to firing positions. And the assualt fire was good when the group came out of the woods.

In the final phase of the assault, several men of the 2d Squad did not move on into the enemy position to close with the enemy in close combat. I am going to cut the platoon one point for that. Three points.

The fire control was good on the whole but there were exceptions. Remember, it is the duty of the men to lend themselves to control just as much as it is the duty of the leaders to exercise control. In combat there is a lot of noise on the battlefield. There was almost as much noise here. You men must keep firing, but you must also look around after every few shots to receive any corrections or instructions from your leaders. I cannot allow full credit for fire control although there was a real effort by every noncommissioned officer to control the fire of his men. Several men would not lend themselves to control. One man in the 1st Squad, when the squad was firing from SEVERSON HILL,

continued to fire high even though the squad leader tried twice to correct him. I doubt whether that man hit a single target. It was the man's, not the leader's fault. I am going to cut you two points for that.

You all know that when you are firing on a target in width, you must distribute your fire back and forth along the line. It's not the man you see high above the grass who is going to cause you the trouble. It's the man low in the grass, along the line, that you can't see at all. It only takes one bullet to kill him. You don't need to keep on pumping bullets at one spot. When the 1st Squad was firing from DEGNER HILL, there were two men about 50 yards apart who each continued to fire at the same point, apparently with no thought of fire distribution. I am going to cut you two points on fire distribution, one for each of these men. Otherwise, fire distribution was pretty good.

That's four points off for the use of cover, one for technique of movements, two for fire control, two for fire distribution, nine points in all from 35, giving you a total of 26 points under "Technique."

Now for the effectiveness of fire. Sergeant, have you those percentages worked out for me? Good. Let's see. We had 24 targets. You hit 21 of them. That's plenty good. You hit 21/24 or 7/8 of the targets, or 87.5% of them. The total points, if you had hit all targets was 20, and 87.5% of 20 is 17.5. So, on the basis of targets hit, you earned 17.5 points. We'll include that half point too because if you earn another half-point to go with it, your final score will be one point better.

Now how about the hits? There were 690 rounds of ammunition issued at the start of the exercise and 313 were turned in when you finished. That leaves 377 rounds fired. There were 136 hits. Dividing the number of hits by the number of rounds fired, we find that your percentage of hits was 36.08. And multiplying that by the total of 10 points allowed gives you 3.6 points for total hits. Adding the points, 17.5 and 3.6,

gives you a total of 21.1 points out of a possible 30 points for effectiveness of fire.

Adding the totals, 30 points for tactics, 26 for technique, and 21.1 for effectiveness of fire, gives you a total score of 77.1. At the bottom of the score sheet it says: "Satisfactory rating: 70 per cent and above," so your score is better than just satisfactory. It was a good job.

ADMINISTRATIVE DETAILS

1. *UMPIRES:*
   - 1 Officer—chief umpire.
   - 3—6 officers—assistant umpires.
   - 1 Range officer.
2. *NONCOMMISSIONED OFFICER ASSISTANTS:*
   - 1 NCO, in charge of ammunition and equipment trucks.
   - 1 NCO, in charge of pits and range guards.
   - 1 NCO, in charge of telephones.
3. *TROOPS:*
   - 1 NCO, and 3 pvts. in shelter pit.
   - 2 Telephone operators.
   - 2—5 Pvts.—range guards.
   - 1 60-mm mortar squad or larger detachment from Weapons Platoon, Rifle Company.
4. *AMMUNITION:*
   - 560 rounds (80% A.P., 20% tracer) Cal. .30 ball ammunition loaded in clips.
   - 120 rounds (80% A.P., 20% tracer) Cal. .30 ball ammunition loaded in magazines.
   - 10 rounds Cal. .30 carbine ammunition loaded in magazine.
   - 12 rounds H.E. 60-mm mortar ammunition.
   - 2 rounds (red) Very pistol ammunition.

CHAPTER 3

Infantry Intrenchments and Weapon Emplacements

Following is the most recent official doctrine in regard to Infantry intrenchments and weapon emplacements. The material contained herein has been approved by Headquarters Army Ground Forces and is being incorporated in changes to and revisions of appropriate field manuals and visual aids to training. For announcement of publication of these changes and revisions, as well as release of new training films and film strips on this subject, consult current editions of FMs 21-6, 21-7, and War Department Training Circulars. Meanwhile, pending the printing and distribution of this material in official form, authority has been granted for its publication in The Mailing List.

PART I

GENERAL

The organization of defensive positions may be classified into two categories; the hastily-occupied defensive positions (hasty), and the more strongly-fortified defensive positions (deliberate). The terms "hasty" and "deliberate" are relative only because it is difficult to indicate a definite line of demarcation between the two. In general, a hasty position is one which can be organized in 8 hours or less with organic equipment and materials, and a deliberate position is one which requires more time to complete. The types of infantry intrenchments and weapon emplacements described herein are those used by infantry in the organization of a *hasty position.*

Intrenchments and emplacements must meet the following requirements:

1. Permit each individual or weapon crew to accomplish the assigned fire mission.
2. Be simple, quickly constructed, and of a minimum number of types.
3. Provide maximum protection with minimum expenditure of time and labor.
4. Provide individually and by groups for all-around defense.
5. Afford maximum concealment and not indicate defensive dispositions.
6. Provide protection against mechanized attack.

In all defensive situations, troops are trained to strengthen their positions and seek protection by the immediate construction of hasty field fortifications.

In the attack, troops are trained to drive forward until the objective is captured and consolidated, taking full advantage of all existing natural features. Positive measures are taken to insure that the momentum of attack is maintained. A change from the offensive to the defensive is a responsibility of command and is justified only when necessary to avoid ruinous losses.

Construction and Camouflage

Full advantage should be taken of *all* existing natural features. Many terrain features may be used in their natural state to provide concealment and protection from fire; frequently a little labor can convert them into strong defensive positions.

Field fortifications usually are laid out and constructed by the troops who are to occupy them.

Tasks are undertaken concurrently so that the position will have progressive over-all defensive strength during its development.

Concealment is of prime importance in locating defensive works. Measures for concealment from aerial observation must be planned from the beginning and carried on continuously throughout the work. Over both the area to be

excavated and that on which spoil is to be piled to form a parapet, all turf, sod, leaves, or forest humus (if present) is removed carefully, set aside, and replaced over the spoil when finally completed. In this connection, attention is invited to the column in Table 1 (fig. 36) showing the area to be camouflaged in the construction of each type of intrenchment described herein.

In order to prevent discovery of the work during the process of excavation, available camouflage nets suspended from stakes or trees should be erected before any excavation is undertaken and the workers should confine their activities to the area beneath the camouflage net. The net is suspended at such a height above the ground as to permit the workers to excavate the emplacement without snagging equipment or intrenching tools on the net. After the excavation has been completed and the spoil covered with sod or other natural camouflage material, the net should be lowered close to the ground so as to be inconspicuous from ground observation. Nets are kept in position so as to conceal the emplacement when the weapon is not being fired. Arrangements must be made to lift or withdraw the camouflage net during action in order not to interfere with the tactical employment of the weapon.

In the interest of clarity, camouflage nets have been omitted in the sketches shown herein and the effect of natural camouflage materials has been subordinated so as to permit the details of construction to be easily seen. For a more complete discussion of camouflage, see FM 5-20.

The concealment of excavation is facilitated by the complete removal of spoil from the site, if this is practicable. When this is done, the excavation must be made somewhat deeper in order to obtain the same protection that is given when the spoil is used to construct a parapet. In disposing of spoil, care must be taken not to create paths or vehicle tracks which might disclose the position, and the spoil must be dumped in inconspicuous locations such as, at the base of trees, along natural drainage ditches, or along hedge rows.

Provision must be made for taking care of rain water, surface drainage, and seepage. In general, a shallow ditch a few inches deep around the excavation will carry off surface water. Water which falls into an excavation or seeps in through the ground must be removed by bailing.

Revetment may be necessary in soft or sandy soil to prevent the caving in of the sides of the excavation. It may consist of lumber, wire netting, small branches, brush, sandbags filled with earth, or other available materials (see fig. 17). The dimensions of the excavation will have to be modified slightly to provide for the space occupied by the revetment.

PART II

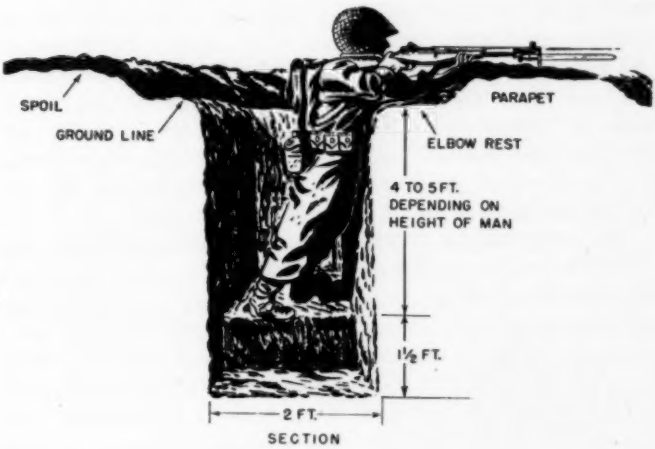
INTRENCHMENTS

It must become a habit of all soldiers to seek protection when halted. Advantage should be taken of natural protection afforded by the terrain, such as, ditches or holes in the ground. Whenever the situation becomes stabilized temporarily, they dig intrenchments for their individual protection and emplacements for the protection of their weapons. This includes crews of all weapons; personnel guarding road blocks, bridges, rear installations, and tactical headquarters; and troops in bivouac or assembly areas.

The defender must locate his intrenchments and weapon emplacements so as to cover a selected area with fire and, at the same time, provide maximum concealment and protection from aerial and ground observation and from enemy fire. These requirements are met when the troops are located in one-man or two-man foxholes and the weapons are emplaced as described herein. In order to confuse the enemy, judicious use must be made of decoys or dummy positions.

Individual Protection

The foxhole is the intrenchment normally dug for individual protection when contact with the enemy is imminent or in progress. Foxholes provide excellent protection from



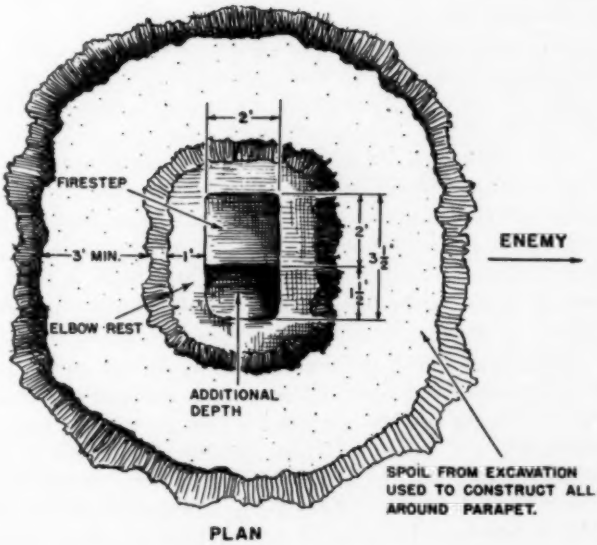


FIGURE 13.—One-man foxhole.

small-arms fire, artillery shell fragments, airplane fire or bombing, and the crushing action of tanks. The one-man and the two-man foxholes are basic types. Often both are employed in a given situation. If a choice of type is not made by higher authority, it is made by the squad leader. The two-man foxhole is used when the mission requires men to work in pairs or when, for psychological reasons, battlefield comradeship is desirable.

For units within the battle position, foxholes are sited with the longer side generally parallel to the front, but they are distributed around weapon emplacements to provide for all-around defense. Troops remain in their foxholes only when an attack is imminent or in progress. Foxholes at intermediate stages of construction afford limited protection depending upon the depths to which the excavation has progressed. In some situations where the need for rest is paramount, commanders may permit soldiers to cease excavation before full depth has been reached.

Considerations affecting the size and shape of the one-man foxhole (see fig. 13) are as follows:

1. It is as small as practicable in order to present the minimum target to enemy fire.

2. It is wide enough to accommodate the shoulders of a man sitting on the fire step.

3. It is elongated to the extent necessary to permit the use of large size intrenching tools in digging it.

4. Its depth from the surface of the ground to the fire step depends upon the height of the man who is to occupy it, but under no circumstances is it less than 4 feet. It should permit him to fire his rifle or other weapons while standing on the fire step.

5. Additional depth for a sump is dug in one end to provide for collecting water so that it may be bailed out and to provide space for the occupant's feet so that he may sit comfortably and have adequate clearance. An additional benefit derived from the sump is that a soldier crouched in the foxhole with his feet in the sump is able to push himself up through debris thrown on top of him by the crushing action of a tank.

The foregoing considerations result in the dimensions shown on figure 13. The soldier should memorize these simple dimensions: 2′ wide; 3½′ long; 4′ to 5′ deep depending upon the height of the man; additional depth at one end for the sump. In most types of soil the foxhole as thus constructed gives positive protection against the crushing

FIGURE 14.—One-man foxhole protects against tanks.

action of tanks which pass directly over it in any direction, provided that the soldier crouches down in the hole so that there is a 2-foot clearance between him and the ground surface (see fig. 14). If the soil is very sandy or very soft, it may be necessary to revet the sides of foxholes to prevent

caving in. The spoil excavated from the foxhole is piled all around the hole as a parapet, leaving a berm or shelf wide enough for the soldier to rest his elbows upon while firing his weapon. It should be spread low, so that the parapet is at least 3 feet thick in order to provide protection against small-arms fire. An all-around parapet made of the spoil excavated from one foxhole will be approximately a half-

FIGURE 15.—One-man foxhole with camouflage cover.

foot high. If turf or topsoil is to be used to camouflage this parapet the soldier must, before commencing to dig, skim off the topsoil over an area 10 feet square and set the material aside for later use. Upon completion of the foxhole he places this camouflage material over the spoil in a manner to imitate the surrounding ground.

In some situations, it may be practicable for the soldier to remove the spoil entirely to an inconspicuous place and

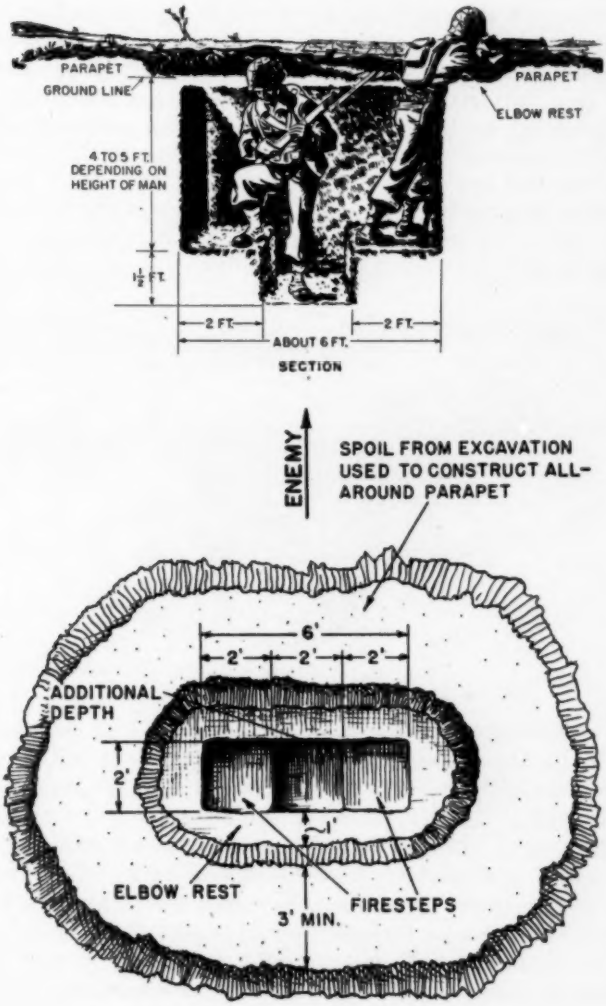


FIGURE 16.—Two-man foxhole.

to improvise a camouflage cover for his foxhole. In this manner, a foxhole position may be rendered practically invisible from either aerial or terrestrial observation. (See fig. 15.) This manner of camouflaging a foxhole position finds special application in defense against a mechanized attack supported by foot soldiers. Individual riflemen occupying foxholes remain concealed until the tanks have overrun the position whereupon they rise up in the foxholes and combat the enemy foot soldiers following the tanks.

The two-man foxhole is essentially two one-man foxholes

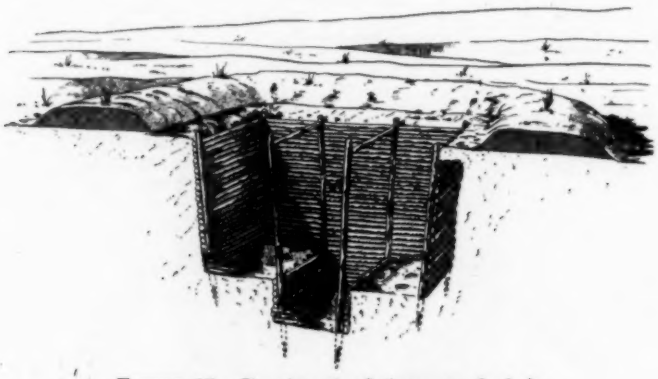


FIGURE 17.—Revetment of two-man foxhole.

dug adjacently. The resulting dimensions are as shown in figure 16. The two-man foxhole, in most types of soil, gives protection comparable to that afforded by the one-man foxhole except that it provides somewhat less protection against the crushing action of a tank's treads applied longitudinally, and slightly less protection against airplane strafing and bombing and artillery shell fragments. Figure 17 shows a two-man foxhole revetted in soft or sandy soil.

The foxhole is an indispensable individual protection, which must be constructed in all combat situations where time and terrain conditions permit. The digging of individual prone shelters (fig. 18) in forward areas will seldom be justified. Individual prone shelters may be authorized for use in rear areas when the danger from ground attack

is remote or when the warning service will insure the availability of sufficient time to construct foxholes. The prone shelter, being shallow, *does not* provide protection against the crushing action of tanks and *is not* suitable as a place from which to fire a weapon. Soldiers lying in prone

FIGURE 18.—Prone shelter (not a fire trench).

shelters offer a larger target than when in foxholes. The prone shelter gives some protection against bombardment by hostile artillery and aviation and against small-arms fire.

CONNECTING TRENCHES

Foxholes furnish the best hastily constructed individual shelter. They are inconspicuous from the air. Siting and digging them is one of the first steps in fortifying a defensive position. To connect the foxholes by means of trenches will reduce the protection afforded the individual, Connect-

ing trenches (fig. 19) are conspicuous as viewed from the air or upon aerial photographs and thus reveal the defensive dispositions. Continuous trenches will not be dug as a normal procedure. When two forces are in contact and dispositions have been revealed beyond any question, a few short trenches may be dug in inconspicuous places to permit necessary daylight movement across exposed areas. Neces-

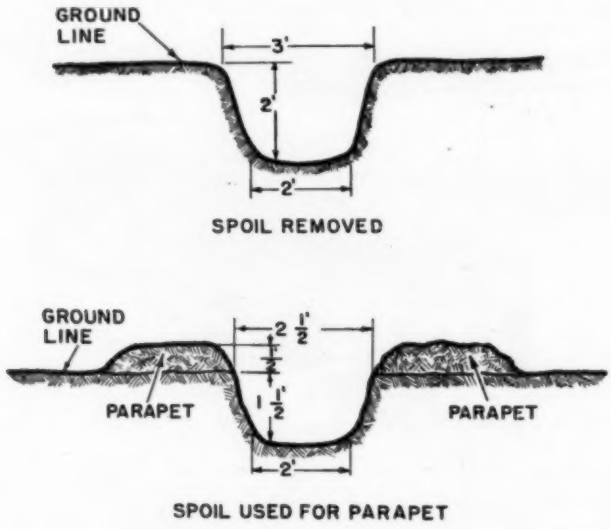


FIGURE 19.—Shallow connecting trench.

sary connecting trenches may also be dug in close country, such as jungle, where disclosure of the position will probably not result. They may be dug under any conditions where their value in additional protection and in facilitating control, communications, and supply outweighs the possible sacrifice of concealment.

Observation Posts

When observers are located in exposed positions, they should be well protected and concealed.

Both the one-man foxhole (fig. 13) and the two-man foxhole (fig. 16) with camouflage cover (fig. 15) are suitable for use as observation posts.

The covered observation post (fig. 20), although an excellent type, takes considerable time to build. The overhead cover provides splinter-proof protection only. It is valuable only when well concealed. It requres 21 cubic feet of excavation per foot of length or a total of 105 cubic feet per 5-foot section.

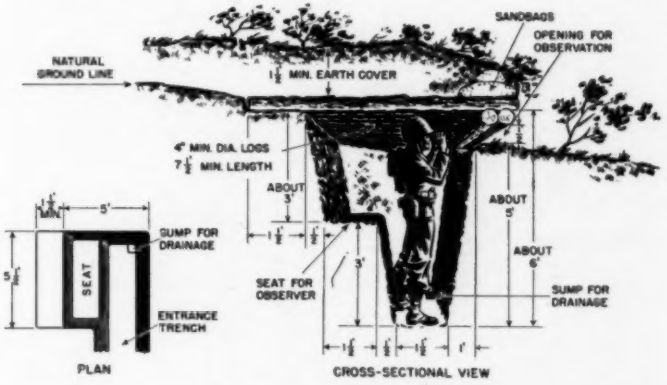


FIGURE 20.—Covered observation post.

Layout of Defensive Positions

Figure 21 illustrates the layout of a squad defensive position, and figure 22 the layout of a platoon in hasty defense. These figures serve as a guide only to give an idea of the application of the intrenchments described herein. Obviously, the terrain can have great influence upon the arrangements, open terrain permitting wide dispersion, close terrain calling for shorter distances between individuals and squads. Troops are disposed in such a manner that

each squad within itself and the platoon as a whole are capable of all-around defense. This is accomplished by the organization of supplementary positions from which fire can be directed to the extreme flanks or rear. First priority

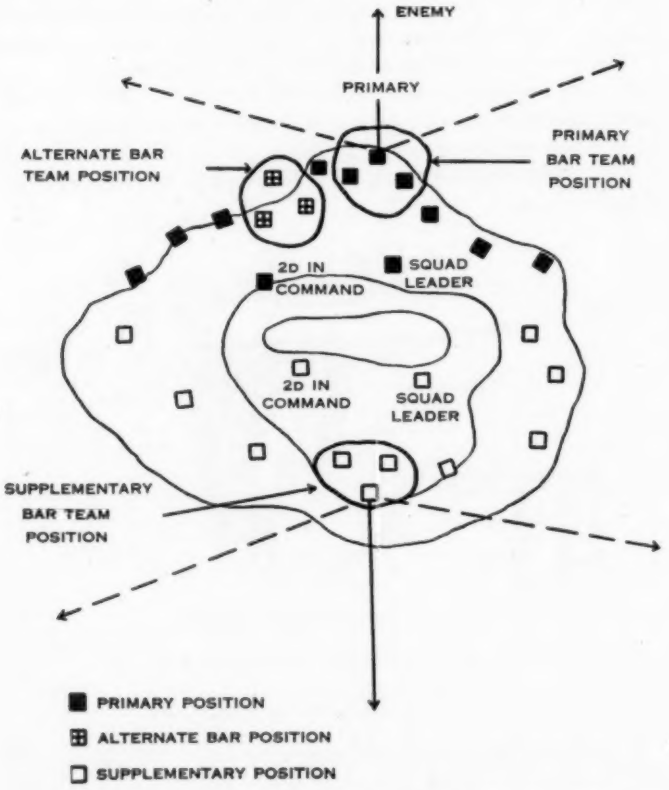


FIGURE 21.—Schematic diagram showing an arrangement of foxholes in a squad defense area.

is given to the intrenchment of the primary position. Time permitting, additional excavation is done in the supplementary positions. Riflemen and automatic riflemen, squad leaders, and platoon headquarters personnel are all given

FIGURE 22.—Perspective view of a rifle platoon in hasty defense.

protection by the construction of one-man or two-man foxholes. The leader will determine the type to be constructed. To prevent discovery of the dispositions by the enemy, the foxholes are irregularly dispersed and care is taken to camouflage them by the methods described herein. Care is also taken to avoid making tell-tale pathways or clearing fields of fire in a manner that might betray the location of the position. Deception can be attained by the construction of dummy positions. To minimize the effects of hostile bombardment, foxholes usually are spaced from 5 to 15 yards apart. The foxhole of the squad leader should be sited close enough to the squad to permit him to issue oral fire orders during the battle. Positions of the squad and platoon leaders must be so related, generally, as to permit communication by defiladed routes or by voice or arm-and-hand signals. Clearing of the field of fire is commenced early and is carried out so that each weapon can accomplish its assigned fire mission. This includes the removal of brush, tall grass, and low-hanging limbs of trees which restrict observation. Trees are left standing because they provide concealment and obstruct the fire less in this position than if they were cut down and not removed.

PART III

WEAPON EMPLACEMENTS

Because of their advanced positions, infantry weapons (machine guns, antitank guns, mortars, and cannon) generally require emplacements for the protection of weapons and crews when in firing positions, and foxholes for protection of those individuals not sheltered in the emplacement. Careful attention is paid to camouflaging emplacements against both ground and aerial observation by means of natural or artificial camouflage materials. Dummy emplacements are constructed as a measure of deception.

Emplacements For Rifle Company Weapons

Automatic Rifle

The automatic rifle is fired from a one-man foxhole and does not require special emplacement.

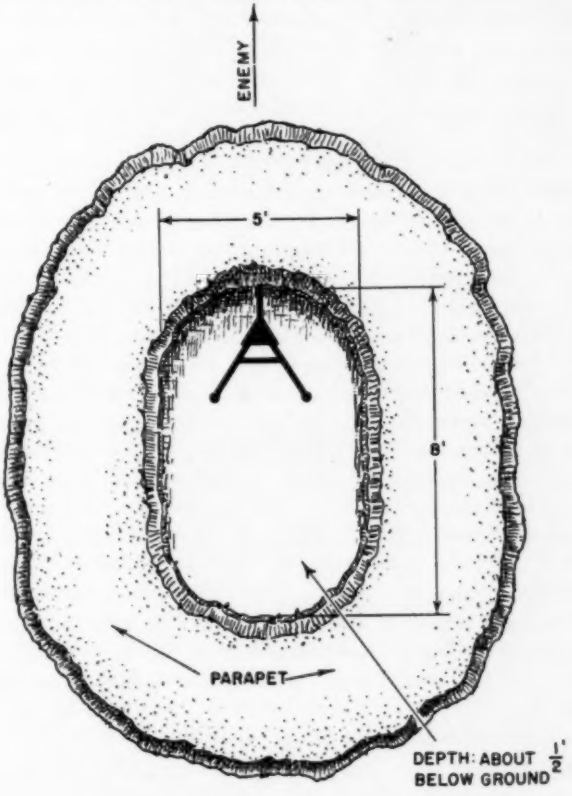


Figure 23.—Initial stage in horseshoe type emplacement for the cal. .30 machine gun (light or heavy).

Caliber .30 Machine Gun (Light)

There are two types of emplacements for this gun: horseshoe type and two-foxhole type.

Horseshoe type (fig 24).—The initial stage in the development of this emplacement is the excavation of an open shallow pit (fig. 23). The gun is placed in firing position ready for immediate action and the crew excavate the emplacement from the prone position if they are exposed to hostile fire. The gun is lowered first by excavating beneath it. Then the area for the crew is excavated about one-half foot below the ground level and the spoil is piled around to make a parapet. The emplacement is completed by the construction of a gun platform about one-half foot below the ground level, large enough to give firm support to the tripod, and a horseshoe-shaped trench along the rear and sides of the gun platform for the gunner and his assistant. The platform should be about chest high. The trench is about 2 feet wide. The spoil is piled completely around the emplacement to form a parapet at least 3 feet thick, care being taken not to make the parapet so high as to interfere with the fire of the gun in any direction. This emplacement furnishes protection against small-arms fire and shell or bomb fragments. In firm soil, tanks may pass over this type of emplacement without destroying the emplacement, the weapon, or the occupants. In loose soil, logs about 8 inches in diameter placed across the front, rear, and sides of the emplacement and embedded flush with the top of the ground help to make the emplacement resistant to the crushing action of tanks. When tanks appear about to overrun the position, the gunner and the assistant gunner remove the weapon from the platform to the bottom of the trench at the rear of the emplacement and they crouch down in the trench. When the tanks have passed, the gun is quickly restored to its firing position on the platform.

Two-foxhole type (fig. 25).—This emplacement consists of two one-man foxholes close to the gun position. To lay it out, a short mark is scratched on the ground in the principal direction of fire, that is, pointing approximately along the middle of the sector of fire assigned to the gun. On the right of this mark a foxhole is dug for the gunner. On the left of the mark and 2 feet to the front another foxhole is dug for the assistant gunner. The spoil is piled all around

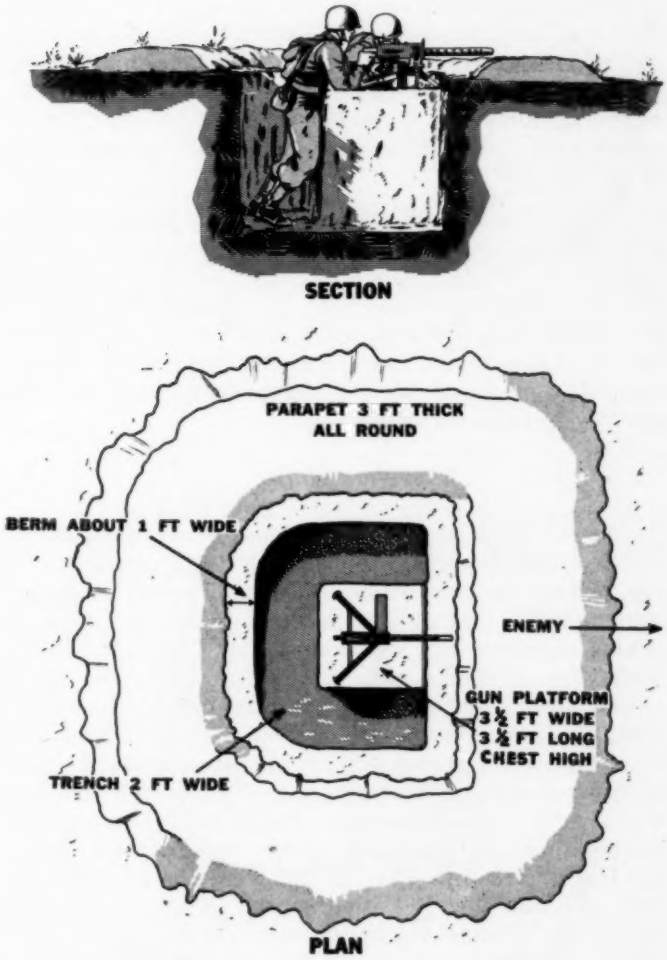


FIGURE 24.
Horseshoe type emplacement for the cal. .30 machine gun (light).

the position to form a parapet, care being taken not to pile it so high as to block the fire of the weapon. In firm soil, the two-foxhole type provides protection for the crew and the weapon against the crushing action of tanks. When tanks appear about to overrun the position, the gun is removed from the tripod and taken into one foxhole, the tripod into the other. The gunner and assistant gunner crouch in the holes.

Choice of type.—The two-foxhole type of emplacement and horseshoe type of emplacement are satisfactory for the light machine gun. As a firing position, the two-foxhole type is a little less flexible than the horseshoe type, but it has the advantage of simplicity and is more tankproof than the horseshoe type. Therefore, the two-foxhole type is generally preferred as the emplacement for the light machine gun.

60-mm Mortar

This emplacement (fig. 28) consists of a rectangular pit which is large enough to accommodate the mortar, the gunner, and the assistant gunner. The emplacement is kept to the minimum size at ground level to afford protection against airplane fire and bombing and against artillery shells, but it allows room for the manipulation of the mortar to fire and provides space for some ammunition. Additional ammunition is placed in nearby shelters. The front edge is sloped so that the aiming stake, about 10 yards in front of the emplacement, is visible through the sight and so as not to interfere with the trajectory of the shell. Foxholes for members of the mortar squad not required at the mortar are prepared not far from the emplacement. The spoil from the excavation is piled all around the pit to form a low parapet. Figure 29 shows the 60-mm mortar in action with only the base plate dug in and the crew operating from one-man foxholes near the weapon position. This two-foxhole type of emplacement is preferred when the mortar is located in a defiladed position.

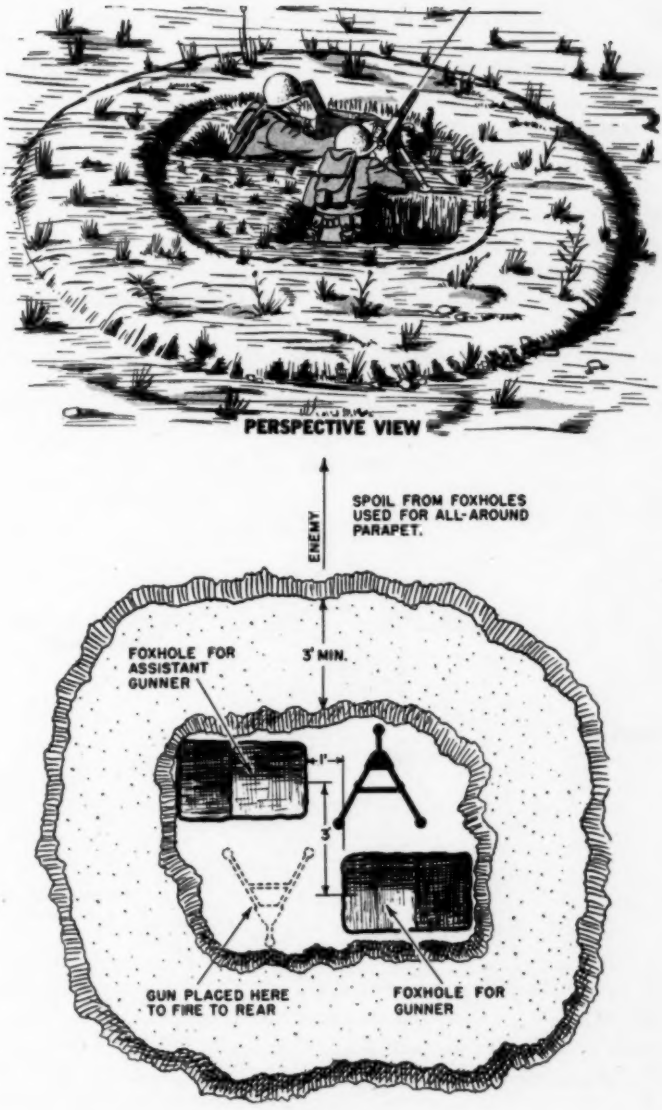
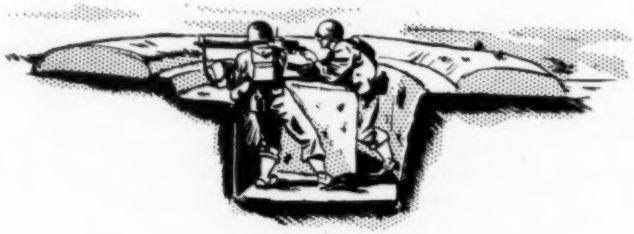


FIGURE 25.—Two-foxhole type emplacement for the cal. .30 machine gun (light).

EMPLACEMENTS FOR HEAVY WEAPONS COMPANY WEAPONS

Caliber .30 Machine Gun (Heavy)

There are two types of emplacements for this gun: horseshoe type and the three-foxhole type.



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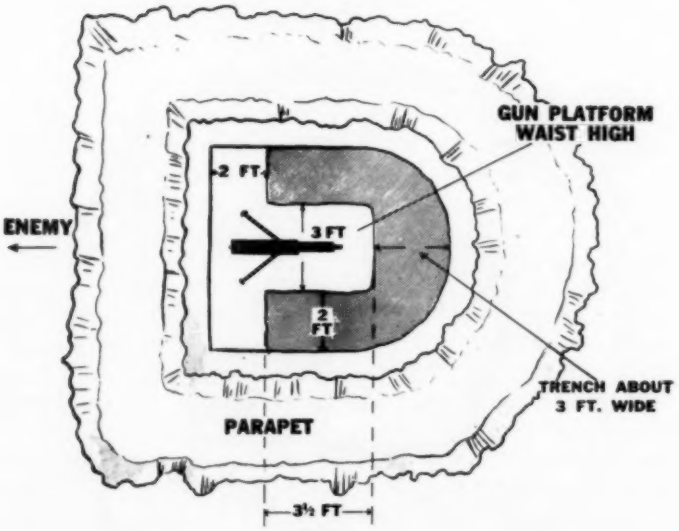


PLAN

FIGURE 26.—Horseshoe type emplacement for the cal. .30 machine gun (heavy).

Horseshoe type (fig. 26).—The initial stage in the development of this emplacement is the excavation of an open

shallow pit (fig. 23). The gun is placed in firing position ready for immediate action and the crew excavate the emplacement from the prone position if they are exposed to hostile fire. The gun is lowered first by excavating beneath it. Then the area for the crew is excavated about 1 to 1½ feet below the ground level, and the spoil is piled around to make a parapet. The emplacement is completed by digging a horseshoe-shaped trench around the rear and sides of the weapon. Care must be taken not to make the parapet so high as to block the fire of the weapon. This emplacement permits easy traverse of the gun through 180 degrees.

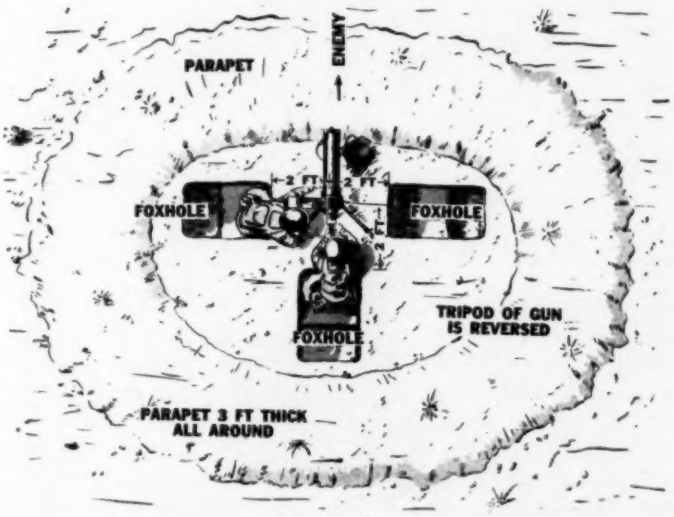


FIGURE 27—Three-foxhole type emplacement for the cal. .30 machine gun (heavy).

To fire aimed shots to the rear, the gunner must get out of the trench and sit on the forward part of the gun platform. In most types of soil, tanks can run over this emplacement without destroying it, the weapon, or the occupants. In loose soil, logs about 8 inches in diameter placed across the front, rear, and sides of the emplacement and imbedded flush with the top of the ground help to make it tankproof.

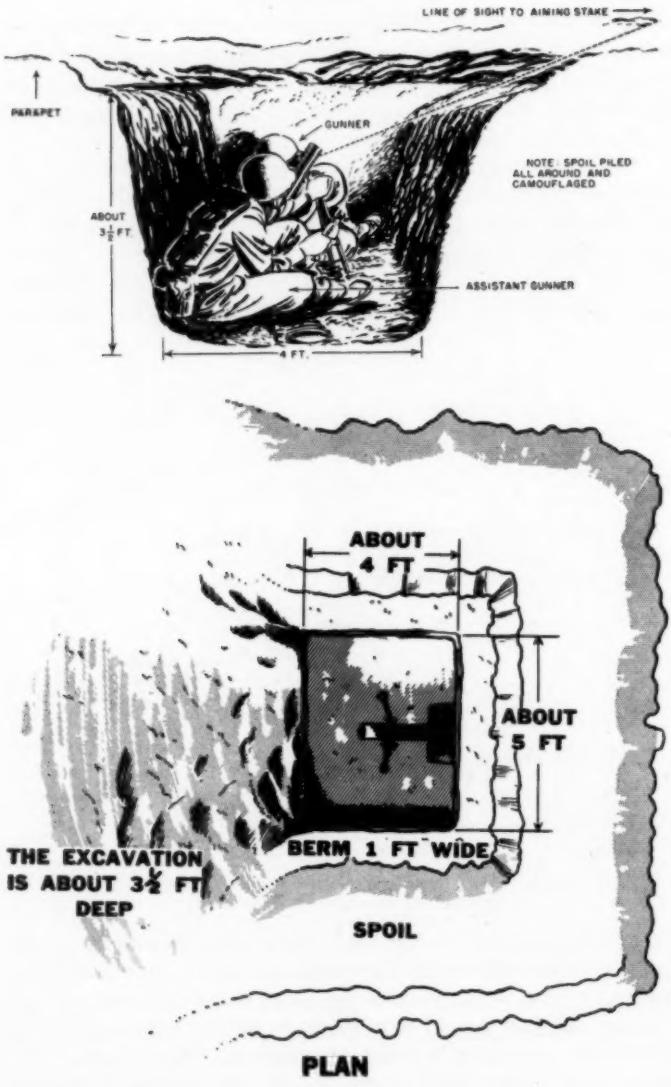


FIGURE 28.—Open emplacements for the 60-mm mortar.

Upon the approach of tanks, the crew, without dismounting the weapon from the tripod, move it to the rear into the horseshoe trench and they crouch down in the trench. When the tanks have passed, the gun is quickly restored to its firing position on the platform.

FIGURE 29.—Two-foxhole type emplacement for the 60-mm mortar.

Three-foxhole type (fig. 27).—The tripod legs for the heavy machine gun are reversed 180 degrees when the weapon is fired from the three-foxhole type of emplacement. This allows the gun to be mounted close to the gunner's foxhole for easy firing. The spoil is piled all around the emplacement to form a parapet, care being taken not to pile the spoil so high as to block the fire of the weapon. The gunner occupies the foxhole to the rear of the weapon; the assistant gunner occupies the foxhole to the left. The third foxhole remains unoccupied until it becomes necessary to fire the gun to the left, at which time the gunner and the assistant gunner shift to the right. When tanks appear about to overrun the position, the gun is dismounted from the tripod and the tripod is collapsed. One member of the crew takes the gun with him into his foxhole; the other member of the crew takes the tripod with him into his foxhole.

Comparison of types.—In general, the horseshoe type and the three-foxhole type of emplacement are both satisfactory. As a firing position, the three-foxhole type is less flexible than the horseshoe type, but in some soils may be more tankproof. The three-foxhole type has the advantage of simplicity since it utilizes standard foxholes. The horse-

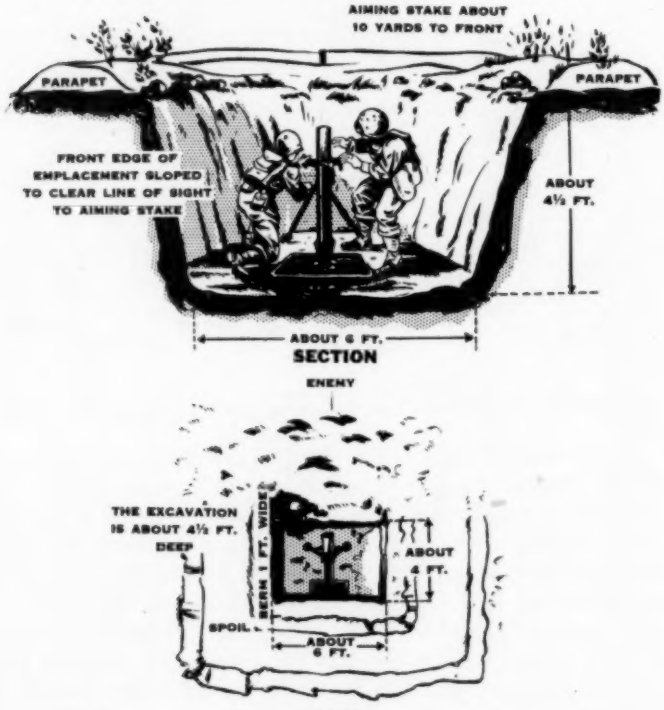
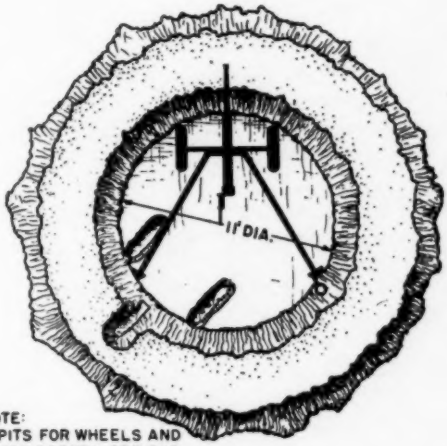


FIGURE 30.—Emplacement for the 81-mm mortar.

shoe type has the advantage that the gun can be more quickly restored to its firing position following a tank attack, since it is not necessary to dismount it from the tripod before sheltering it in the bottom of the trench. For the latter reason, the horseshoe type is generally preferred for the heavy machine gun.

PERSPECTIVE VIEW



NOTE:
PITS FOR WHEELS AND FOR BARREL ARE DUG. WHEN NOT FIRING, GUN IS PLACED IN THESE DEPRESSIONS SO AS TO BE BELOW LEVEL OF PARAPET FOR PROTECTION.

PLAN

SECTION

FIGURE 31.—Circular type emplacement for the 37-mm antitank gun.

ML 4

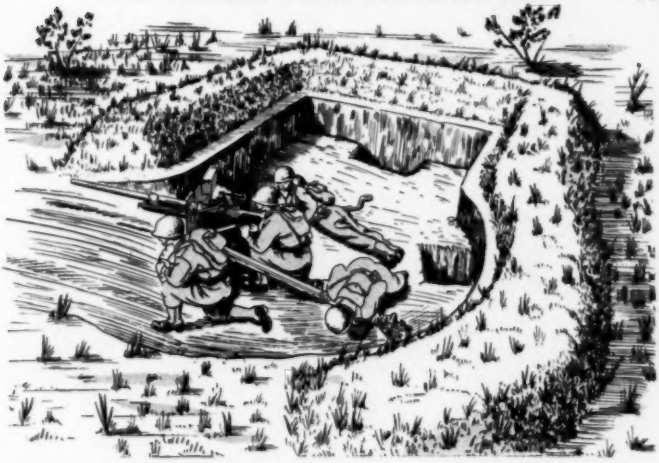
81-mm Mortar

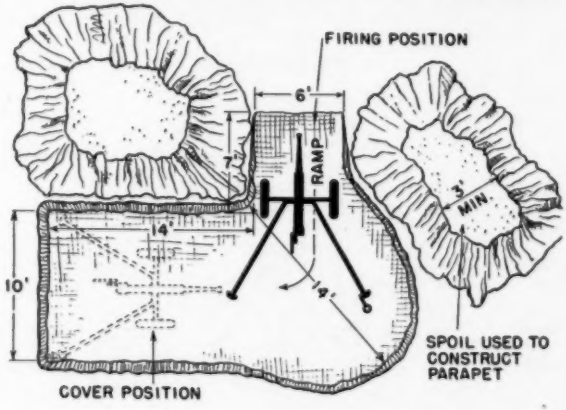
This emplacement (fig. 30) consists of a rectangular pit which is large enough to accommodate the mortar, the gunner, and the assistant gunner. The emplacement is kept to the minimum size at ground level to afford protection against airplane fire and bombing and against artillery shells, but it allows room for the manipulation of the mortar to fire and provides space for some ammunition. Additional ammunition is placed in nearby shelters. The front edge is sloped so that the aiming stake, about 10 yards in front of the emplacement, is visible through the sight and so as not to interfere with the trajectory of the shell. Foxholes for members of the mortar squad not at the mortar are prepared not far from the emplacement. The spoil from the excavation is piled all around the pit to form a low parapet. An ammunition niche may be dug into the side of the pit and should be revetted.

Emplacements For Antitank Guns, Antitank Platoon of Battalion Headquarters Company and Regimental Antitank Company

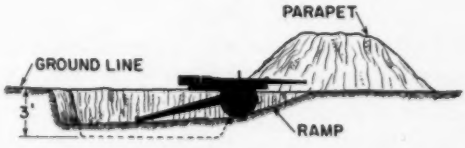
37-mm Antitank Gun

For this weapon there are three standard types of emplacement, each adapted to a special situation. For flat terrain, the circular type emplacement (fig. 31) is preferred; it gives all-around fire. For sloping terrain, the rectangular pit type of emplacement with ramp (fig. 32) is preferred since it gives partial defilade with a minimum of visibility to ground observation. In those situations in which the direction of enemy approach can be definitely foreseen, as in covering a road block in a defile, the fan type of emplacement (fig. 33) is preferred since the gun in this emplacement is always ready for instant action without the necessity of moving the gun from the cover position to the firing position.





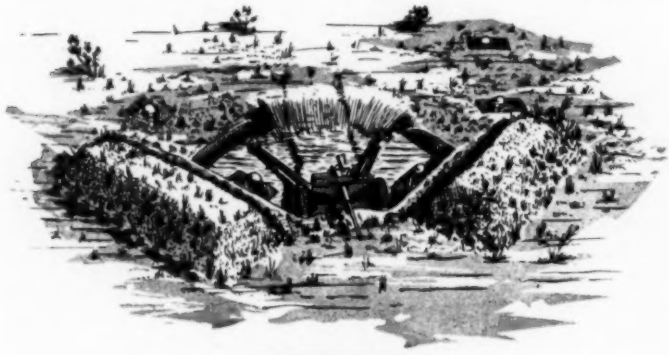
PLAN



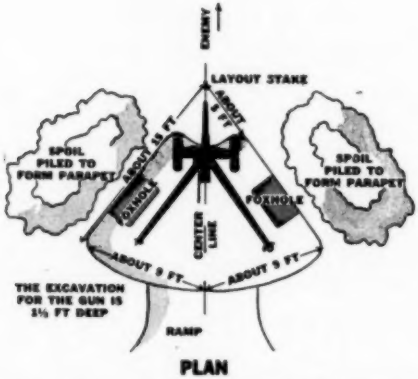
SECTION

FIGURE 32.—Rectangular pit type emplacement for the 37-mm antitank gun.

The circular type emplacement (fig. 31) consists of a circular pit, 11 feet in diameter and 1 foot deep (measured from ground level). With an all-around parapet 4 feet wide and approximately 9 inches high, this provides an em-



PERSPECTIVE VIEW



PLAN

FIGURE 33.—Fan type emplacement for the 37-mm antitank gun.

placement about 21 inches deep for the protection of the weapon crew from direct fire while the weapon is in operation. When the weapon is not firing, the crew seeks protection in foxholes dispersed around the emplacement. Additional ammunition is placed in nearby shelters. An

ammunition pit may be dug in the center of the emplacement or into the parapet. The gun is maneuvered quickly to fire in any direction by elevating the barrel (using the

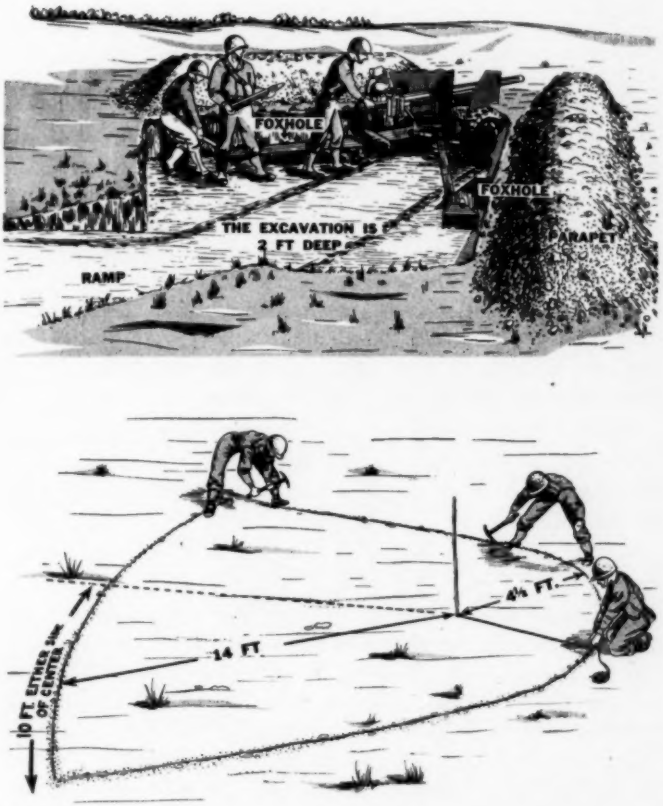


FIGURE 34.—Fan type emplacement for the 57-mm antitank gun. The excavation is 2 feet deep.

elevating screw), lifting the trails, backing the gun to the center of the emplacement, turning it in the desired direction, and pushing it forward against the bank. The banks

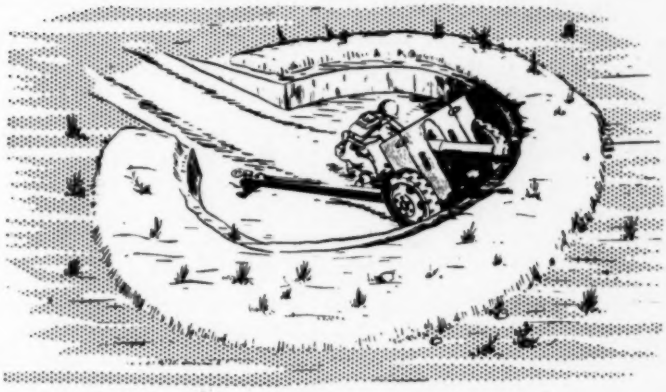
should be sloped to facilitate moving the gun into and out of the emplacement. Pits for wheels and a slit in the parapet for the gun barrel allow the whole piece to be lowered below the parapet when not firing.

The rectangular pit type of emplacement (fig. 32) consists of a rectangular pit 10½ feet wide by 14 feet long and 3½ feet deep. To get the gun into and out of this pit, a ramp is excavated which may be in extension of the pit or may be turned at an angle thereto, depending upon the sector of fire assigned to the gun. The spoil is piled alongside the excavation to form a parapet. The gun is backed into the rectangular pit when not in firing position. If the ramp is turned at an angle to the pit, a curved elbow is excavated to permit movement of the piece around the corner. Several foxholes may be dug inside the emplacement without interfering with the movement of the weapon. Additional foxholes are dug in the near vicinity for the remaining members of the gun crew.

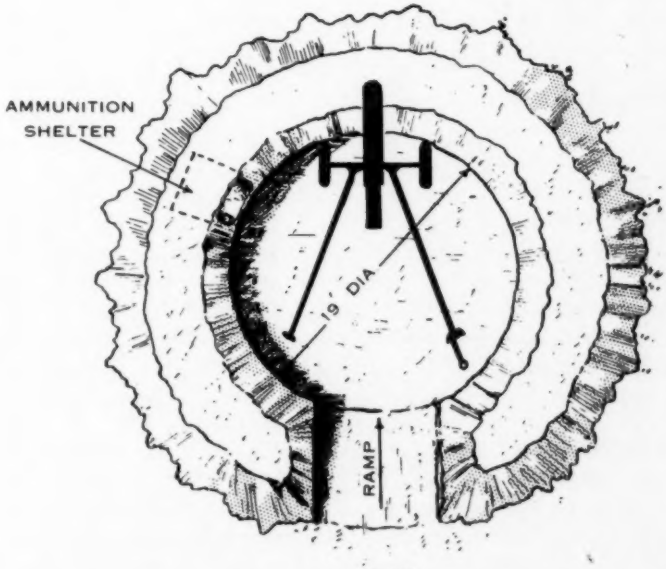
The fan type of emplacement (fig. 33) permits the firing of the gun in a limited arc but permits its instant use upon the appearance of the target. The ramp is to the rear of the emplacement.

57-mm Antitank Gun

Figure 34 illustrates the basic type of emplacement for this weapon. It permits fire through an arc of approximately 110 degrees. If desired, larger sectors of fire may be obtained by modifying the parapet accordingly. This, however, decreases the protection afforded the gun crew. The ramp by which the gun is moved into and out of the emplacement is normally in rear of the emplacement, but it may be in the forward part of the emplacement if terrain conditions require. Foxholes for the gunner and the assistant gunner are dug within the emplacement. Additional foxholes for other members of the crew are dug in the near vicinity. The spoil is piled to either side of the emplacement to form a parapet approximately 2½ feet high and 3 feet thick.



PERSPECTIVE VIEW



PLAN

FIGURE 35.—Emplacement for the 105-mm howitzer.

EMPLACEMENTS FOR CANNON COMPANY WEAPONS

105-mm Howitzer, M3

Figure 35 illustrates a circular type of emplacement, 19 feet in diameter, permitting all-around fire. The pit is dug about 2 feet deep and the spoil is piled in a low parapet all around the emplacement. A ramp for the movement of the weapon into and out of the emplacement is dug to the rear. Foxholes for members of the crew are dug in the immediate vicinity of the emplacement.

PART IV
WORK ESTIMATES

TABLE 1

Weapon	Type of Emplacement	Area to be Camouflaged	Excavation Cubic Feet	Man-Hours to Construct in Medium Soil*
Rifle	Foxhole	10 ft. x 10 ft.	37	1½
Automatic Rifle	Foxhole	10 ft. x 10 ft.	37	1½
Cal. .30 MG, Lt	Horseshoe	15 ft. x 15 ft.	123	7
	2-Foxhole	12 ft. x 12 ft.	74	3
Cal. .30 MG, Hv	Horseshoe	15 ft. x 18 ft.	140	8
	3-Foxhole	15 ft. x 15 ft.	111	5
60-mm Mortar	Pit	14 ft. x 14 ft.	70	4
81-mm Mortar	Pit	16 ft. x 16 ft.	108	6
37-mm AT Gun	Circular	21 ft. x 21 ft.	110	5
	Fan	29 ft. x 29 ft.	195	10
	Rectangular	27 ft. x 36 ft.	550	28
57-mm AT Gun	Fan	24 ft. x 39 ft.	410	21
105-mm Howitzer, M3	Circular	29 ft. x 29 ft.	430	22

*Based on observation of actual construction at The Infantry School.

FIGURE 36.

Table 1 (fig. 36) gives estimates of the quantity of excavation and the man-hours required to construct the emplacements described above. Attention is especially invited to the over-all dimensions of the area which must be camouflaged in order to conceal each type of intrenchment.

CHAPTER 4

Infantry—Artillery Cooperation

The field artillery, principal supporting arm of the infantry, has one primary mission: *to enable the supported infantry, in its decisive action, to advance against the enemy with sufficient fire power and shock action to break the final hostile resistance.*

What are the capabilities of the artillery for carrying out this mission? For concrete illustration let us take a stock situation, with a division in position, in contact with the enemy: sixteen rifle platoons stretched across a 4,000-yard front, approximately two and a quarter miles; the remaining 65 rifle platoons disposed in depth behind them, ready for maneuver and for any mission of support, reinforcement, or exploitation; the 27 weapons platoons, 9 heavy weapons companies, 18 antitank platoons, and 9 cannon platoons of the infantry emplaced within the same zone; and the supporting artillery.

In depth, without displacement, the howitzers of the artillery can fire at any range up to four miles deep into enemy territory. Some of these guns can reach to a considerably greater depth. In width, they can lay down a continuous and simultaneous band of barrage fires across three-fifths of the division front. In intensity, they can pour projectiles on a single target area at the rate of four tons a minute. In maneuverability, they can engage a dozen targets simultaneously, shift to as many others within a minute, and shift back to the original targets a minute later.

This range of capacity is attained through the interlocking and cooperating system normally employed in the control of division artillery: direct support, general support, and reinforcing missions. If infantry and artillery

are to function intelligently, to get the most out of their partnership and so win the decision in battle, it is essential that the infantry officer understand this method of control and organization—how he should take advantage of it and what he must contribute to increase its effectiveness. For he must contribute. Sound and progressive planning on his part is essential, and it is equally essential that all pertinent information of his plans be transmitted to the supporting artillery at the earliest possible time. The fruits of active and aggressive observation and the information obtained by all intelligence agencies must also be made available promptly to the artillery command. Over and beyond these active contributions, he must give up something if the full flexibility of the artillery support is to be maintained—each infantry commander must be prepared to do without his proportionate share of artillery support when an adjacent commander's need is more critical. By so doing he gains assurance that he in turn may receive more than his proportionate share of such support when his is the more critical need.

The knowledge necessary to implement this active cooperation and teamwork is essential to infantry officers of all grades. There are three general subjects with which all should be familiar. First are the critical ways in which artillery differs from infantry in organization, in methods and mechanics of operation, and in its system of cooperation between its own units. Second is the pattern in which division artillery is arranged and the fitting of this pattern into the concrete situation. Third are the agencies of liaison which implement the marriage of artillery and infantry.

Perhaps the most important among the differences between the two arms is the greater effective range of the artillery. Light artillery delivers its punch against an enemy observed anywhere within a six-mile radius of its emplacement. Its maneuver therefore, at least within the extent of effective observation within that radius, is by shifting the aim of the piece—not by physical displacement of personnel and matériel. The effect of this fact is to

telescope the time factor of maneuvering in comparison with the requirements for moving infantry units. And in this lies the secret of the rapidity and flexibility of support; the capacity of one gun, or a dozen guns, to participate in the fire fight at one point, and a minute or so later, in response to the changing needs of the tactical situation, to shift fires to another area perhaps six miles distant from the first. In consequence, displacement of all artillery installations and personnel, with the exception of observers, is less frequently necessary than is the case with infantry. Furthermore, more latitude is available in taking advantage of favorable terrain for siting the pieces.

Its superior battlefield control, made possible by comparative freedom from enemy interference, and its ability to strike at great distances in any direction, combine to make it unnecessary that the artillery hold units in reserve locations for tactical employment in a developing situation. New missions can be promptly undertaken by artillery which, in the infantry sense, has already been "committed." Therefore all of the division artillery supports the action of the division from its entry into action. The *true* reserve of the artillery is a reserve of ammunition.

In general, while the observer for infantry weapons is charged with the adjustment of the fire of a particular weapon, regardless of the location of the target, the artillery observer is charged with the adjustment of fire upon a particular area, without regard to which battery or battalion delivers the fire. The information secured by the artillery observer is transmitted to the fire direction center which, in turn, transmits the data to the unit which engages the target. The infantry system is adapted to infantry needs, which require individual adjustment of each piece, and of each piece upon each new target, at comparatively short ranges. The infantry gunner and observer function as a team whose joint effort is necessary not only in initiating the action, but continuously throughout the action. The typical target of the infantry mortar, for example, is a point target, and play-by-play interchange

between the individual gunner and observer is necessary to reduce such a target.

In contrast, the artillery deals usually with area targets, massed fires, and firing data that is coordinated so as to be equally useful for any of its howitzers. This body of data is incorporated in the system of survey employed by the artillery. The survey system establishes the relative position and elevation of all the howitzers in the division artillery. In addition, the artillery makes greater use of precision instruments in computing ranges, elevations, and directions. It is the function of the observer to fit the positions of targets into this survey system and transmit the resulting information, through the fire direction center, to the firing batteries. Regardless of which may be his own battery or battalion, any observer can, by correcting his plotting of the position of a target, adjust the fires of any of the howitzers with equal facility.

The important thing, then, from the standpoint of the artillery commander, is to have all, or as much as possible, of the enemy terrain in front of the division under observation by the various observers under his command. To that end, the system has been established whereby an observer is given responsibility for a zone—a section of terrain—rather than for the fires of any particular howitzers. This whole basic idea is perhaps brought into sharper focus by citing one of the artillery's rules for the conduct of the reconnaissance and preparatory planning of artillery commanders: observation posts should be widely separated; any concentration of observers in a given locality, even though affording superior observation, should be avoided.

As an additional means of observation, the division artillery is equipped with liaison-type airplanes, together with the personnel necessary to operate and maintain them. The primary function of these light planes is adjustment of fire. They are used only in situations where ground observation will not suffice. Operating behind friendly forward elements, they provide altitude for artillery observation when such altitude is not available on the terrain within the area of operations.

While communication should be a primary consideration in the planning of any military commander, it is the very life-blood of the artillery. Even with a complete breakdown of all communications, the individual infantryman in contact with the enemy retains the capacity of recognizing that enemy and using his individual weapons against him. But the howitzers of the artillery might as well be absent from the field of battle altogether as to be out of communication. The artillery battalion may be likened to a single giant infantryman, with its observers (eyes and ears) to provide information of the enemy, its fire direction center (brain) to assimilate the data obtained by the observers and formulate appropriate action, and its firing batteries (hands and weapons) to carry out the actions ordered by the fire direction center. In the human being it is the nerves that transmit messages from eye to brain to hand. In the artillery battalion it is the wire nets, the radios, the pyrotechnics and the messengers; in short, its communication system. In either, if the communication is destroyed the entire machine is helpless and useless.

So large a role does communication play in the operation of the artillery that one out of six enlisted men in each firing battery is assigned primarily to such work, and in the division artillery as a whole there are nearly as many men engaged in communication duties as there are assigned to the service of the pieces. Most of these specialists are wiremen and radio operators. Telephone is the most satisfactory means of communication because it permits instantaneous transmission, it is safe from interference, and its use leaves no doubt as to whether or not a message has been received. But telephone lines are relatively difficult to install. They are subject to disruption by enemy fire, and they require large amounts of material which is difficult to transport and often impossible to recover. Therefore, telephones may be impractical in rapidly moving situations. For these reasons the possibility and ease of laying wire lines is a tactical consideration in selecting locations for all artillery installations, and it is essential

that displacements be reduced to a minimum. This applies, so far as possible, to firing positions, command posts, fire direction centers, and observation posts.

Characteristics of the fire of artillery weapons not only differ from those of infantry weapons but also are far more capable of adjustment to adapt them to differing tactical situations, different terrain, and varying missions. In the first place, because the howitzer shell has a higher trajectory than the machine-gun bullet, it can be fired over higher masks; therefore from more deeply defiladed positions and into more deeply defiladed targets. Furthermore, because the propelling charge may be increased or reduced, the trajectory may thereby be adapted to the relative positions and heights of particular masks and targets. Different types of fuzes and different settings of the fuze provide other means of adapting the fire to the better accomplishment of the mission. For example, there are two methods available to the artilleryman seeking to inflict casualties on dug-in enemy personnel, a type of target upon which normal artillery fire is generally ineffective. He can employ a time fuze, set to explode the shell when it is in the air directly over the target. Such fire, however, must be carefully observed and precisely adjusted. He can also employ ricochet fire by using a delay fuze. For this, the shell must be so fired that it strikes the ground at an angle usually less than 300 mils, the exact limiting figure depending upon the type of projectile and the nature of the soil. It is aimed to strike the ground in front of the target, and the delay fuze is set so that the explosion occurs when the shell, ricocheting from the ground, is in the air above the target. With too high an angle of impact the shell will bury itself in the ground instead of ricocheting, in some instances reemerging, in others exploding underground. The principal advantages of ricochet fire are that it can be employed as unobserved fire, and it is so much more effective than impact burst fire that if only 50 per cent of the projectiles burst on ricochet, the results are remunerative. For these

reasons it is employed wherever possible against dug-in personnel.

Another difference between infantry fire and artillery fire is of particular importance to the infantry commander in his tactical planning. Artillery fire is normally delivered at much greater ranges than is the fire of any infantry weapon. Since dispersion is proportionately greater at these greater ranges, area targets are the most suitable targets for artillery fire. Furthermore, artillery is better able to cope with such targets because artillery weapons normally have larger supplies of ammunition than do infantry mortars or cannon. Infantry weapons, on the other hand, typically have close ranges and direct, individual contact with their observers. These characteristics facilitate the reduction of point targets.

These, then, are the salient differences between the two arms which are most important for the infantry officer to bear in mind in the course of tactical thinking:

1. The artillery's long reach, which makes it possible for the weapon to be sited in a defile some six miles from the point of impact of its fire.
2. The flexibility of fire of each artillery piece, which makes it unnecessary that a reserve be constituted.
3. The artillery's zone system of observation, which makes it possible to deliver the fire of all guns on any area within range and in the zone of any observer.
4. The artillery's dependence on communication, which requires that plans for the establishment thereof be primary in all planning for artillery employment.
5. The artillery's adaptability of fire, which makes it possible to employ different techniques to adjust to various missions and various types of terrain.
6. The artillery's greater dispersion factor and larger supply of ammunition, which make it useful for the reduction of area targets.

Anything that is holding up the advance might be an artillery target. However, certain weapons give the best results on certain types of targets. The commander with

the best understanding of the particular virtues and limitations of each of the weapons available to him will get the most out of his armament.

As a general rule the fires of two types of weapons should not be used on the same target to accomplish the same mission. For example, to place artillery and machine-gun fire on the same enemy defense area to neutralize the hostile troops is a waste of fire power. It is, however, economy of fire power to use artillery fire on an area to establish neutralization until the advancing troops are endangered by that fire, then to lift the artillery fire and maintain the neutralization by machine guns so placed that the assaulting troops can approach from the flank of that machine-gun fire. It is economy of fire power to use a mortar to destroy a machine gun whose exact location can be observed, while using artillery on an area from which is coming the fire of machine guns whose exact position cannot be determined. It is economical to use an infantry cannon to knock down a stone house in which an enemy machine gun has been located, and to use the fire of a battalion of field artillery to blast down a block of houses in some of which hostile troops have taken positions.

In offensive action most hostile targets, and certainly the most dangerous ones, will not reveal their locations until they are forced to do so by the advance of our troops. When we are defending, although we make the very best plans to stop the enemy in front of our main line of resistance, he has the initiative, and will usually do the unexpected. We must expect that he will sometimes penetrate our position and we cannot foresee where that penetration will occur. Cooperation between the infantry and its supporting artillery and the coordination of fire of the weapons of both arms must be continuous, and it is only after the battle is joined that this teamplay is really tested. Effective coordination and cooperation will permit the artillery fire to be placed where *it* will do the most good, and the mortar and machine-gun fire and the fire of all other supporting weapons to be placed where they will contribute most to that

decisive step, the closing of the infantry rifleman with the enemy.

Cooperation during the battle requires that the artillery be informed of plans to use reserve infantry units in order that necessary changes may be made in observation and

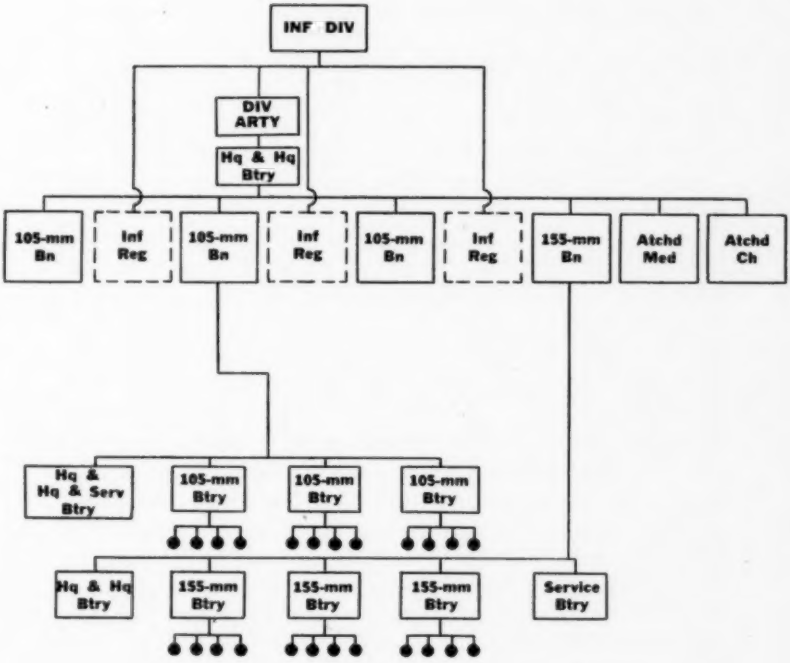


FIGURE 37.—Organization of the division artillery as related to the infantry regiments.

communications, or possibly in the dispositions of the firing batteries. It requires that the actions of the infantry be coordinated with the displacement of the artillery. Conversely, the artillery must be prepared to take over missions of the heavy weapons company when displacement of mortars and heavy machine guns becomes necessary.

Now let us see how this powerful supporting arm is organized within the division in order to make its full power available to the infantry.

Under command of a brigadier general, who functions also as a member of the division commander's staff, the division artillery comprises three battalions of 105-mm howitzers (light artillery) and one battalion of 155-mm howitzers (medium artillery). (See figure 37.) The division commander's first decision for the artillery, in any action or contemplated action, is the assignment of these four battalions. The usual practice is to place one light battalion in direct support of each front-line infantry regiment.

Since only two of the three infantry regiments in the division are normally assigned front-line missions upon the initiation of an action, this plan utilizes but two of the four artillery battalions. But since it is unnecessary to constitute an artillery reserve, immediate missions are appropriate for the two remaining battalions. They are normally placed in general support of the division, which means that their fires are used to support the action of the entire division. It is also usual to give to each of these general support battalions the additional mission of reinforcing one of the direct support battalions. Thus, at the outset of an action, each front-line infantry regiment will normally have one artillery battalion in direct support, with reinforcing fires from a second battalion available as well. With such an allocation, the artillery commander can employ all artillery fires for direct support of the front-line battalions at certain times; at other times employ one medium and one light battalion on general support missions; or even use the fires of the two direct support battalions for general support missions, if required by the situation.

An infantry regiment is habitually supported by the same light artillery battalion. This tends to develop closer cooperation between artillerymen and infantrymen through intimate understanding of each other's habits of thought and methods of work. The decision, then, as to which of the three light artillery battalions will be in general support

will usually depend upon the division commander's decision as to which infantry regiment will be held in reserve. When, in the course of action, the third infantry regiment is committed, the third battalion of 105-mm howitzers will be transferred from general support of the division to the direct support of that regiment. The battalion of medium howitzers will normally remain in general support.

In combat, the lessening of general support fires to reinforce direct support fires is far more frequent than the reverse situation, wherein direct support weapons are called upon to shift to general support. This is because general support fires are principally directed on enemy rear installations such as assembly areas, ammunition depots, critical points in enemy communication lines, and particularly enemy artillery positions (counterbattery fire). For such work, the 155-mm howitzers, and even larger weapons, are more suitable than the 105-mm's. Moreover, such fires are also the missions of corps and army artillery, and this artillery of the higher echelons is better equipped for such missions. Therefore, close support missions—fire upon enemy forward areas and installations—constitute the bulk and most important part of the work of the entire division artillery.

If this force is to employ its full capacity and full flexibility, there must be a means of transmitting information to and among all the units. The communication net provides this means. In the division artillery staff, the communication officer supervises the establishment of communications. The artillery command post must be connected with its observation posts, the division command post, and the installations of the several artillery battalions. As explained above, telephone is the most desirable means of communication for this purpose, so these facilities are installed whenever possible. To create this wire net, the division artillery and its component units have the following organic telephone equipment: approximately 175 EE-8 telephones, 250 miles of wire, and 40 switchboards.

The tremendous strides in radio development since the last war have been of great aid in solving the artillery communications problem. The SCR-600 series—crystal controlled, frequency modulated—are now issued to the field artillery. There are more than one hundred radio sets in the division artillery net. The improvement in radio communication has increased considerably the effectiveness of artillery fires placed in close support of the infantry. These radios are used to transmit not only firing data, but also information as to the location and movements of the elements of the supported infantry.

In addition to wire and radio communication, the field artillery uses flags, pyrotechnic signals, and foot and motor messengers. Without adequate communications, the artillery battalion is just as helpless as our giant infantryman whose nerves have been paralyzed. With adequate communication, an uninterrupted flow of vital information as well as orders from the division commander converge at the command post. The decisions based on this information flow instantly to the units which are to carry them out.

Once the initial dispositions and decisions have been made, however, the bulk of the work of the artillery is performed within the administrative cycle of the individual battalion. All of the direct support missions are normally carried out within the compass of the infantry regiment and its supporting artillery battalion. Even the reinforcing fires of a battalion assigned such a mission are effected through a direct link between installations of that battalion and the direct support battalion which it is reinforcing.

The artillery is organized so that higher and lower echelons accomplish their installations and calculation of firing data simultaneously rather than successively. Division artillery prepares a survey which will be linked to the target locations and firing data of the several battalions. Individual battalions prepare similar data for their batteries. Both these tasks are begun at the earliest possible moment and either may be completed first. Thus, instead of waiting for the broad picture to come down from division

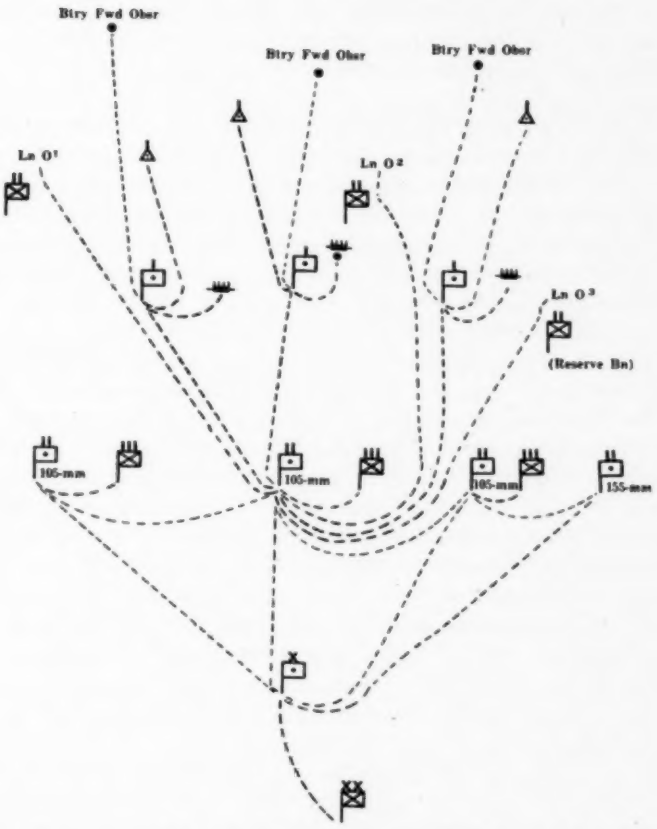


FIGURE 38.—Schematic diagram of communications within division artillery. Communications pertaining to center battalion are shown in detail. Lines indicate only that direct communication between connected installations exists. Actually, several means of communication might exist between each installation indicated.

and then filling in the details, each battalion puts its own house in order, even to the extent of opening fire if the occasion requires. The data of all battalions are then connected to the general plan set up by division artillery headquarters.

Meanwhile, the means of transmitting these data is established in the form of the battalion communication net. This may be a wire installation as complete as the division net. Indeed, if time permits, wire is always laid to all initial installations with the possible exception of forward observation posts or other points where very early displacement is anticipated, and where the probable situation will make the recovery of such wire impracticable. The ideal is to have every member of the artillery team connected by wire with every other member of that team, and in actual combat the practice is to approach that ideal as closely as consideration of all circumstances indicates is practical.

The tactical situation will dictate the means of communication to be used. In moving situations, radio, messengers, visual means, and voice are used until the situation becomes sufficiently stabilized to warrant the installation of a wire net. Means other than wire are not discarded upon the installation of the wire net, but are continued as secondary means which become the primary means in case of wire failure or when displacement becomes necessary to the accomplishment of the mission.

The completed system of communication, (see figure 38) regardless of what means are used, provides connection between—

(1) Each battery forward observer and his battery and the battalion fire direction center.

(2) Each liaison officer and the battalion fire direction center.

(3) Each firing battery and its primary observation post, battery forward observer, and the battalion fire direction center.

(4) Each battalion command post and adjacent artillery, supported infantry regiment, and the division artillery command post.

(5) The division artillery command post with all its own subordinate units and with the division command post.

It is obvious that all this takes time. And there are many situations in combat where time for such preparation is

not available. Can the artillery give support in such situations? It can, and it does. Consider the extreme situation of a meeting engagement developing from the approach march. During the march the artillery will have its own reconnaissance and observation parties following close behind the point of the advance guard. The guns will be to the rear; some with the reserve of the advance guard if the unit is a large one, all with the main body if the column is smaller. The forward reconnaissance parties will have communication with the guns by means of radio, messengers and prearranged visual signals. The best available maps or map substitutes—probably aerial photographs or mosaics specially supplied by aerial reconnaissance performed in anticipation of the march—will be available to both the reconnaissance party and the other units following behind. These maps or map substitutes used by both echelons will be identical, in order to provide a common basis for use in any situation that may arise. As it proceeds, the forward reconnoitering element will continually seek out favorable battery positions and will communicate information thereof to the batteries in march. It will also look for observation points as the terrain to the front unfolds.

Such work will provide the basis of operations should an unexpected meeting with the enemy occur. In such case the forward group would instantly place itself in the most favorable point of observation within reach and apply itself to observing and locating hostile targets. By radio, or by other available means of communication, these target locations would be relayed to the guns which meanwhile would have been taking up positions in the nearest reconnoitered area. The rapidity with which targets would be engaged and the accuracy with which fire could be adjusted would be limited only by the speed, initiative, and resourcefulness of the artillery personnel, abetted by the smoothness and rapidity with which advance unit infantry commanders reported pertinent information to the artillery observation party.

In a more stable situation, however, we find a more elaborate and more closely organized network into which the infantry officers of the division must feed the raw material—the information from which is forged the close support and teamwork essential to success. The channels are there and ready. While it is vital that the infantry officer understand what his principal supporting arm can do and how it does it, all this knowledge is useless unless he also understands what he must do to put the machinery into operation.

The most hopeless attitude is that of the infantry officer —fortunately increasingly rare—who says "What do I care about the artilleryman's problems; it's his job to support *me*." No one with a mind like that ever played successfully on a team. The ball carrier who does not know what the blocking back can and cannot do, who even excludes the blocking back from the huddle, isn't going to carry the ball anywhere. So the infantryman, who must carry the ball in combat, should have full appreciation of and make full use of the support which the other arms—the blocking backs—can give him, and he must have them present at his staff conferences and when he issues his orders. In a word, let them hear the signals called so they can fulfill their assignments.

The first contact established between the direct support artillery and the supported infantry is "command liaison" —direct personal contact between the two commanders. For this purpose the artillery commander reports in person to the infantry commander. This personal contact is essential during the initial planning phase of an action, and when the infantry plan of maneuver must be changed or modified during the action; for example, when initial objectives are taken or when the progress of an attack is stopped or slowed. There will be periods when his command duties require the artillery commander to be elsewhere. During such intervals he is represented at the infantry regimental command post by a staff officer who has authority to make decisions and who thus maintains command contact with

the infantry regiment. To facilitate command liaison, the artillery battalion command post is located in the vicinity of the infantry regimental command post when possible. If this is impracticable, then communication with the infantry, by wire if possible, is established and maintained by the artillery.

What does this command liaison accomplish? It produces the general plan of artillery support. This plan is progressively formulated in personal conferences between the infantry regimental commander and the artillery battalion commander prior to and during the reconnaissance which they should make together. By the time the reconnaissance is completed, the following information usually will be available for discussion: the missions prescribed by division for both units; the infantry regimental plan of maneuver; the basic plan of employment of the infantry cannon and any attached supporting weapons; and the general artillery plan to support most effectively the infantry plan of attack.

The general artillery plan usually includes the following items:

(1) *The use of the available artillery in an artillery preparation before the attack.*—An artillery preparation is a schedule of intensive fires delivered during the period prior to the attack to secure domination and neutralization of located hostile artillery and forward defense installations. Its duration may vary from several minutes to several hours or even days. It continues until the time the attack is launched, and all artillery of the force participates. The decision as to whether or not an artillery preparation is fired is a command decision of the force commander. His decision should be governed by the probable effect of the preparation weighed against the loss of tactical surprise, the number of remunerative targets which can be accurately located in time to prepare the fires, and the sufficiency of ammunition supply to permit the expenditure of the required ammunition. While the artillery preparation may be divided into two or more phases, it is the last phase,

just prior to the attack, in which the infantry regimental commander is most interested. For it is in this last phase that the mass of the artillery directs its fire on the enemy forward positions. The regimental commander will wish to discuss with the artillery battalion commander the allotment of artillery fires to his attacking battalions so as to insure the neutralization of those known targets which most threaten his scheme of maneuver.

(2) *The assignment of normal and emergency barrages in defense.*—In a defensive situation, the infantry regimental commander must allot the normal and emergency barrages to his battalions. Each artillery battery can fire one normal barrage, a defensive fire of first priority. A normal barrage is part of the final protective fires of the battalion. Emergency barrages are planned defensive fires but must never be considered as part of the final protective fires. They are additional or reinforcing fires which a battery can deliver when its normal barrage is not needed. There can be as many emergency barrages as there is time to plan concentrations for the areas to be covered, but each battery can fire only one emergency barrage at a time. A barrage of either kind covers a maximum of 200 yards frontage.

(3) *Initial priority of support.*—The infantry and artillery commanders discuss and the infantry commander decides which of his battalions *initially* should be given the priority in calls for artillery fire. This priority may be changed as the battle progresses. "Priority" does not mean exclusive use of the artillery. It does mean that in the event of simultaneous calls for artillery fire from more than one infantry battalion, that battalion to which the regimental commander has given priority will get the fire. The other battalions and the regimental commander should always be informed of the conflict in requests.

(4) *Special missions.*—Another point for discussion is any request by the infantry commander for special missions, such as smoke missions by the artillery. The 155-mm howitzer shell, because of its larger size, is a better source of smoke than the 105-mm shell. A request for smoke from

the artillery will usually be transmitted to the division artillery commander by the commander of the direct support battalion. The 105-mm howitzer can fire smoke shell but such screening missions should normally be accomplished by some other weapon, thus permitting the direct support artillery to use its high explosive shells for the neutralization fires in close support of the infantry.

(5) *Methods to be used in requesting fire.*—The infantry commander must decide, and inform the artillery commander what methods are to be used in calling down, lifting, and shifting supporting artillery fires. Positive two-way communication should always be used if possible. Division Signal Operation Instructions normally designate several pyrotechnic signals to be used to call for or to lift artillery fires. The use of such signals should be limited to emergencies when other means of communication fail, since the receipt of pyrotechnic signals cannot be acknowledged and since these signals are visible to enemy observers. A decision must be reached, and included in orders to all subordinate units, as to just what means, including pyrotechnic signals, are to be used.

(6) *Protective fires.*—The general location of protective fires to cover reorganization on the contemplated regimental or intermediate objective should be discussed, since a unit which is reorganizing is particularly vulnerable to counterattack. These fires should be planned to cover possible assembly areas for a counterattacking force as well as to cover their avenues of approach.

(7) *Massing of fires.*—It may be necessary for the infantry regimental commander to designate the area or areas in which he wants the artillery to be able to mass its fire. Ordinarily this will not be necessary since the variable trajectory of the 105-mm howitzer usually permits the fire of the battalion to be massed anywhere within range of the battery positions. Unusual terrain—mountainous regions, for example—may make such a decision desirable.

(8) *Requests for additional artillery support.*—The need for additional artillery support may have become apparent

during the reconnaissance. The artillery battalion commander will ordinarily make the request for additional artillery support through the division artillery commander. If it is granted, the plans for the use of such additional artillery are handled by the commander of the direct support artillery battalion.

(9) *Coordination of antitank and antiaircraft defenses.*—The coordination of antitank and antiaircraft defenses, including the warning service, should be decided. Most of the problems involved will be matters of standing operating procedure. However it is well for the infantryman to remember that the artillery positions are primary objectives of tanks. For antitank defense, each battalion of light field artillery has its howitzers and rocket launchers. For antiaircraft defense, each battalion of field artillery has sufficient caliber .50 machine guns, mounted on trucks, to permit 3 such guns per mile of road space while on the road, or to establish perimeter defense of the battalion while in position. In general, the infantry and artillery should each establish its own complete antitank and antiaircraft defenses, in order that gaps in those defenses will not be created by the forward movement of the infantry. Once established, if there are portions of these defenses which overlap, proper coordination will prevent duplication of effort and will permit the strengthening of other portions of the position.

(10) *Time and place liaison officers are to report.*—Finally the artillery battalion commander should be informed as to where and when the infantry regimental commander will issue his order. This information is necessary to enable the artillery commander to have his liaison officers report at the proper time to the infantry battalion commanders with whom they will work.

When the liaison officers report to the battalion commanders, the second of the three forms of contact between the infantry and artillery is set in motion and begins to function. A liaison officer and his accompanying section is maintained with each infantry battalion. Organically

there are three liaison officers and sections provided in the divisional light artillery battalion. Each liaison section has its own means of communication with its battalion command post, using radio, telephone, visual signaling, and messenger service.

The liaison officer should, if possible, report to the infantry battalion commander prior to the issuance of the infantry regimental order. He *must* report in time to accompany the infantry battalion commander when that officer makes his reconnaissance prior to issuing the battalion order. The infantry battalion commander is the officer who is responsible for the detailed selection of those areas on which close support fires are to be delivered, not only those of his organic supporting weapons but also of any supporting artillery and other weapons. This close support fire is placed in front of friendly troops and extends to the front as far as the limit of the effective range of small-arms fire. This is the fire that immediately assists the advance of the foot troops and also protects them when they are attacked. For the artillery, just as for the infantry, the close support fires must be planned on the ground during the reconnaissance of the infantry battalion commander. Assisted by the artillery liaison officer, the battalion commander selects the exact locations for normal and emergency barrages in defensive action, and the exact locations of fires in support of the advance of his battalion in offensive action. He studies the map and the ground with the artillery liaison officer and they arrange for supporting fires to be placed, on call, on areas which the enemy might use. Together they complete the detailed arrangements for the delivery, shifting, and lifting of the supporting fires.

Battery forward observers constitute the third form of contact between the two arms. One observer is sent into the forward area by each of the three firing batteries of each artillery battalion. The 105-mm battalion which is to be in direct support of the reserve infantry regiment, if and when that regiment is committed, may postpone this

assignment of its forward observers until the action has developed and the probable mission of the reserve regiment is apparent. In such a case this battalion will carry out its immediate reinforcing missions with the aid of liaison officers sent to the reinforced artillery battalion.

The forward observers have the primary mission of observing suitable artillery targets in areas that are defiladed from the battery and battalion observation posts. They have direct radio communication with their battalion fire direction center in order to control the artillery fires which they request and observe. Each forward observer has a radiotelephone and has wire communication with the fire direction center, at least from his initial point of observation. The forward observers may or may not have direct communication with the liaison officers who are with the infantry battalion commanders, but this contact can always be established through the fire direction center. That is an available channel of communication for the infantry officer to remember in case his own radio communication breaks down.

Each forward observer is assigned a zone of observation for which he is directly responsible at all times. That does not mean that he must stay physically within that zone, or within any particular given area. He must move to the point which currently offers the best observation of his zone. He cannot tie himself to any infantry unit commander, because if he does, his movement will be limited to the zone of action of that particular unit, and it probably would prevent him, in most cases, from performing his primary mission—that of observation. He must be free to move within his zone so that he may always be available to adjust artillery fire as directed by the fire direction center. Although he is sent out from one battery, he is to observe the fire of all three batteries—and batteries of the other battalions, if need arises—in his particular zone of observation.

The forward observer must establish and maintain contact with infantry units operating within his zone. He

does this when he first arrives in the forward area—either in person or through the members of his detail—and he learns from commanders of these units the location of their front lines, the general situation, and the plan of attack. He tells these infantry unit commanders where he will be located for observation initially, and what probable successive locations he may occupy as the infantry moves forward.

The forward observer also establishes contact with any observers of the mortar platoons and infantry cannon platoons who may be operating within his zone of observation. Obviously his job of locating targets and adjusting fire will be made easier by contact with these infantry weapons observers. This contact will permit cooperation to the end that artillery and infantry fires are each assigned those missions in which they are most efficiently employed.

As soon as these contacts are established, the observer goes to his initial location, organizes his detail, and goes about his business of observation and adjustment. His operating technique differs in certain important details from that of infantry observers. An initial request for fires must contain three elements: the location of the target, (one method of expressing this location is in terms of its azimuth and distance from a known point which the observer can see and which the fire direction center can locate on the map or chart) ; the nature of the target in sufficient detail to provide the basis for a decision as to the type of fire to be employed; and whether or not fire will be adjusted. The battalion fire direction center will figure firing data for all three batteries from this information, and all batteries will lay their howitzers by this data. If there is to be adjustment, however, only one battery will fire for adjustment.

While the technique of adjustment of artillery fire differs from that used for infantry weapons, it is easily mastered. And it is valuable knowledge for the infantry officer; perhaps it may be priceless should he find that the battery

forward observer through whom he is receiving artillery support has become a casualty.

In reporting the data for adjustment, the observer knows only the general location of the firing battery. He cannot know the correction in mils, for he does not know the exact range. To avoid confusion he always gives the error in yards. The fire direction center knows even less about the location of the observer. Therefore the observer must report the error not as it appears from his location, but in terms of the line gun-target. The fire direction center, from this information, calculates the necessary correction in mils deflection and elevation and directs the firing of another round. For example, assume that the battery is firing across the observers front from left to right. (See figure 39.) If the strike is 200 yards right of the target from the observer's standpoint, it is an over in terms of the line gun-target, and the observer's report will be "200 long." If the strike is 100 yards closer to the observer than is the target, the observer, giving the error in terms of the line gun-target, will report "100 right."

The normal proportion of artillery support for infantry units permits a maximum of three forward observers within the regimental zone of action. Note that this number bears no relation to the number of rifle companies initially committed. The zones of observation assigned to batteries usually do not coincide with the zones of responsibility of the rifle companies, but overlap them. There will be occasions, however, when the forward observer will be ordered to remain with the infantry company commander for a limited period of time. Let us take as an example a maneuvering company moving over a concealed route, where observation is particularly poor and where the success of this company will determine the success of the battalion, and in turn the success of the regiment. In this case the forward observer may well be of greater value to both the infantry and the artillery by accompanying that company commander until the latter reaches his objective. The company commander will want artillery fire before

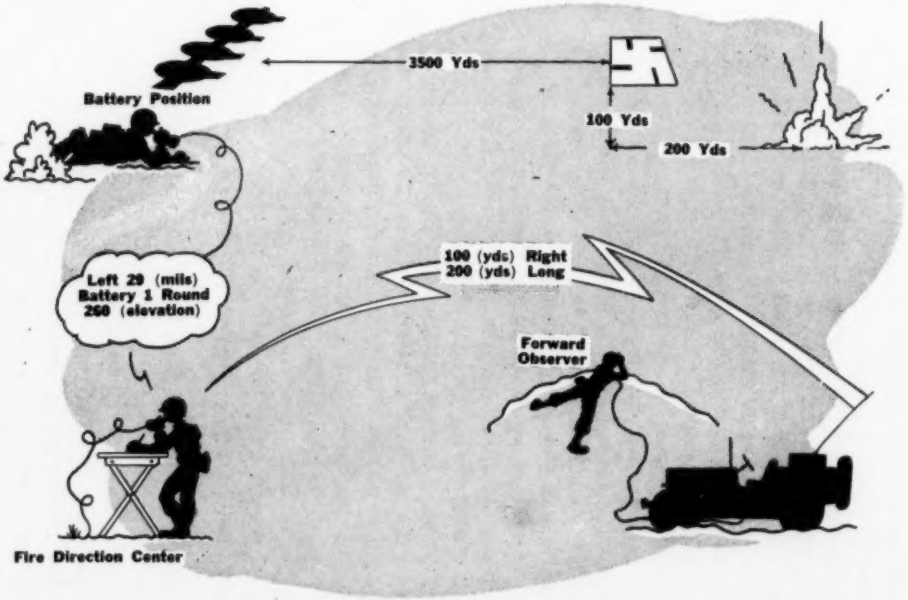


FIGURE 39.—Schematic diagram (not to scale) of the adjustment of artillery fire. The observer notes the location of the burst and describes it as being 200 yards long and 100 yards right of the target. The fire direction center reports the correction, computed from the error and the range, as 29 mils left, 260 mils elevation, and an additional round is fired. This process is repeated until effective fire is placed on the target. Meanwhile the target has been given a number and future requests for fire on "Concentration No. ....." can be promptly fulfilled by application of the firing data thus established.

he gets there, and he will want this fire lifted at the precise moment in the attack when it will do him the most good. He will not want this artillery fire lifted until he is perhaps 100 yards away from it. That is far closer than the old peace-time safety factor of 300 yards, but just what did that 300-yard safety factor mean? It meant that no one beyond that 300 yards would become a casualty. Troops that have had even a small amount of combat experience are willing to approach to within 100 yards of their own artillery fire before requesting that it be lifted. While artillery fire is falling, and for a short time thereafter, the enemy will keep down in his foxholes and emplacements—that is why he dug them. He cannot successfully bring small-arms fire to bear on the attackers while artillery is driving him into the ground. But if the artillery fire is lifted while the attacking echelon is well outside the safety limit, and if the assault is launched from there, the enemy will have ample time to get back into action and employ rifle, mortar, and machine-gun fire against the advancing troops. On the other hand if artillery fires are held on the hostile position until troops are within assaulting distance, they will be able to close with the bayonet before the enemy has fully realized that artillery fire has ceased. Troops will suffer some casualties from their own artillery shell fragments, but such casualties will be far fewer than the number they would receive from aimed, enemy small-arms fire.

All the requirements that have been discussed above are implicit in the term "close support." Because of them, contact with the artillery forward observer becomes a matter of life and death to all infantry officers. It is vital that there be transmission of information of two kinds: information of targets that are impeding the action of the infantry units, and information of the location and movements of the infantry unit itself.

All commanders must recognize that maintenance of liaison is a mutual obligation. The artillery furnishes the personnel and the communications, but it isn't enough to

have these means working for the infantry. Cooperation means working together toward a common end. The infantry must cooperate with the artillery personnel. When an infantry battalion or regiment receives information of the location of front-line units, that information must be transmitted to the supporting artillery at once. The artillery needs and acts on that information just as soon and just as decisively as the infantry commanders themselves. Platoon leaders and company commanders must make it habitual practice to give artillery forward observers every bit of information of the location and plans of their units when the forward observer contacts them. Every plan, even tentative plans, should be transmitted to the artillery without delay. That is the only way in which intelligent artillery support can be assured. And that support must be intelligent always; never mechanical, stereotyped, or rule-of-thumb.

It is only through full cooperation between the two arms that the field artillery can attain its basic objective:—*to enable the supported infantry, in its decisive action, to advance against the enemy with sufficient fire power and shock action to break the final hostile resistance.*

CHAPTER 5

General Considerations of Defensive Combat

The field of tactics is divided into three general types of military operations: (1) offensive combat, (2) defensive combat, and (3) retrograde movements. An understanding of these operations may be simplified by saying that a unit in contact with the enemy either (1) moves forward in the attack, (2) defends its ground in place, or (3) moves away from the enemy in order to avoid decisive combat under the conditions which exist at the time. The subject of defense is further divided into sustained defense and the defense of a fortified position. The latter, defense of a fortified position, is a special operation and is omitted from this discussion. Because defensive combat and retrograde movements employ methods that are similar in many respects, these related subjects are usually grouped under the general subject of defense.

Military events of the past several years tend to glorify the doctrine of offensive combat and to discredit the advocate of defensive tactics. This is as it should be, for there is no all-out, sure-fire solution to offset a determined attack by overwhelming numbers. We should not contemplate the adoption of a defensive attitude in military operations, unless such an attitude is clearly forced by the situation. Overreliance on static defense measures will kill the fighting spirit of any army, and a commander who examines a prepared position with the idea, "This is where I fall back to" fails in the first essential of leadership—a resolve to win the fight.

"Our defensive doctrine contemplates the organization of a battle position to be held at all costs, and the use of covering forces to delay and disorganize the advance of the enemy

and to deceive him as to the true location of the battle position." (FM 100-5, par. 598.) Therefore, from the standpoint of the small unit occupying a defense area on the battle position, defensive combat must be considered as an end in itself. From the point of view of a large force, however, defensive combat should be considered solely in the light of its combination with offensive combat.

Many tactical advantages naturally accrue to the attacking force. The most important advantage results from the attacking force's ability to mass its effort at a decisive point, while the defending unit must defend everything, not knowing just where or when the enemy will strike.

Numerical inferiority does not *necessarily* commit a command to the defense; such inferiority may be overcome by superior leadership, better training, better armament, greater mobility or higher morale. The adoption of a defensive attitude, however, is prima-facie evidence of relative weakness and is indicative of a partial loss of initiative.

The defending force must attempt to compensate for its weakness by an intensive use of deception and concealment of dispositions, by the methodical preparation and coordination of fires, and by thorough organization of the ground.

The mission and the situation generally impose definite limitations in respect to the locality where resistance may be offered. Within these limitations the commander selects a position that will enable the defending force to offer battle under the most favorable conditions. The defensive position must force the enemy to make a direct attack or a time-consuming maneuver. A position that can be readily avoided has no defensive value. Infantry commanders have only a limited latitude in the choice of positions; the general location of the battle position is indicated by higher authority. The detailed location is, however, determined on the ground by the infantry commanders.

With time at their disposal, certain advantages accrue to the defending force. By means of greater knowledge of their surroundings, they are better able than the attacking force to adapt their dispositions to the terrain. Defensive organization, coupled with better control and coordination,

permit the holding of ground with relatively fewer troops. Against these advantages, however, the defending force will always have the great disadvantages of loss of initiative and restriction of maneuver.

The primary means of defensive action is fire power, yet the defending force must be mobile and aggressive. The commander must shift his forces so as to surprise the enemy and meet, with maximum strength, the enemy's most determined thrusts at points of decisive importance. A defensive system based on holding successive lines results in dispersion of forces and is suitable only to the purposes of delaying action.

The defensive zone is divided into three echelons: (1) the security echelon, occupied by troops whose purpose is to obtain early information of the hostile advance, secure the battle position, and delay and disorganize the hostile approach; (2) the battle position, where the main resistance will be offered, and (3) the reserve area, occupied by the reserve troops which are held mobile for counterattack or counteroffensive action.

The security of a command is a responsibility of its commander. The security echelon for a battle position is divided into (1) aviation, (2) general covering forces, (3) general outpost, (4) combat outpost, and (5) local security. (See figure 40.)

First: Aviation, both combat and reconnaissance, will operate deep into enemy territory, securing information and disrupting the hostile effort.

Second: A general covering force under the commander of the defending force operates well to the front of the battle position. Its purpose is to secure information and cause the maximum delay of the hostile advance. This force must be highly mobile and should consist of mechanized and motorized units, strongly reinforced with antitank weapons and supporting artillery.

Third: The establishment of a general outpost is usually delegated to division commanders, although it is the responsibility of the force commander. Its mission of security, information, delay, and deception, requires that it be located

on dominant terrain so as to protect the battle position from observed artillery fire. It is desirable to have the general outpost near enough so that the artillery within the battle position can render effective fire support without displacement. If the terrain is suitable for long-range observation, the general outpost should be out about 6,000 yards. However, an outpost which is more that about 3,000 yards from the battle position should have artillery attached, because communications beyond that range become over-extended; also, such attachment permits fires deeper into enemy territory and further aids the preservation of secrecy as to the exact location of the battle position. In general, the combat action of the general outpost is governed by the principles of delaying action.

Fourth: The establishment of a combat outpost is frequently delegated to front-line battalion commanders, although it is a responsibility of each regimental commander occupying a sector of the battle position. A combat outpost will be maintained at all times except when the general outpost is located comparatively near the battle position. The strength of a combat outpost on a battalion front may vary between a rifle platoon, when a general outpost is in position, and a rifle company reinforced by machine guns, mortars, antitank guns, and cannon company weapons, when no general outpost is covering the front. Artillery support for the combat outpost is provided by observers who go forward from batteries located within the battle position. The location of the combat outpost should deny the enemy close observation of the battle position and should protect the position from all fires except long-range artillery. A maximum distance from the main line of resistance of from 1,500 to 2,000 yards should be sufficient.

Fifth: Local security (not shown on figure 40) is the responsibility of each front-line company commander. These detachments constitute a warning service and are maintained irrespective of any security measures provided by higher authority. They are usually located on the next crest in front of the main line of resistance, and are seldom more than 500 yards from the main line of resistance.

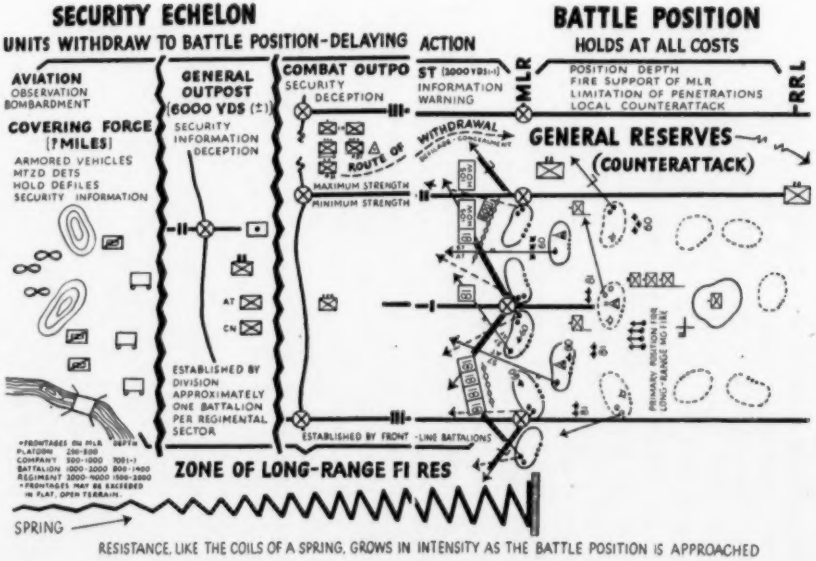

SECURITY ECHELON
UNITS WITHDRAW TO BATTLE POSITION-DELAYING ACTION
BATTLE POSITION
HOLDS AT ALL COSTS
AVIATION
OBSERVATION
BOMBARDMENT
COVERING FORCE
(7 MILES)
ARMORED VEHICLES
MTZD DETS
HOLD DEFILES
SECURITY INFORMATION
GENERAL
OUTPOST
(6000 YDS (±))
SECURITY
INFORMATION
DECEPTION
COMBAT OUTPO
SECURITY
DECEPTION
ST (3000 YDS(±))
INFORMATION
WARNING
MLR
RRL
POSITION DEPTH
FIRE SUPPORT OF MLR
LIMITATION OF PENETRATIONS
LOCAL COUNTERATTACK
WITHDRAWAL
GENERAL RESERVES
(COUNTERATTACK)
ROUTE OF
MAXIMUM STRENGTH
MINIMUM STRENGTH
AT
CN
ESTABLISHED BY
DIVISION
APPROXIMATELY
ONE BATTALION
PER REGIMENTAL
SECTOR
ESTABLISHED BY FRONT-LINE BATTALIONS
ZONE OF LONG-RANGE FI RES
SPRING
RESISTANCE, LIKE THE COILS OF A SPRING, GROWS IN INTENSITY AS THE BATTLE POSITION IS APPROACHED

FIGURE 40.

The next echelon in the zone of defense is called the *battle position.* (See figure 41.) This position may be defined as a belt of organized ground having a depth of from 1,500 to 2,000 yards, extending from the main line of resistance to the rear and including the regimental reserves. It is divided into regimental sectors and is held by the fire of deployed infantry units and their supporting weapons, and by the counterattack of reserves. Each regimental sector is divided into battalion defense areas, the battalion into company defense areas, and the company into platoon, two-squad, or one-squad defense areas forming mutually supporting, closed works capable of all-around resistance. Holding garrisons organize and defend the mutually supporting defense areas into which the regimental sector of the battle position is subdivided.

Regimental reserves are primarily intended for counterattack of penetrating elements and flank defense of the regimental sector. They may be held mobile in defiladed areas or used to occupy previously prepared positions. On open terrain, with some cover, a battalion is ordinarily the smallest unit holding out a counterattacking force, whereas in close terrain, a company, or even a platoon may hold out a counterattacking echelon, especially when the unit is required to defend a relatively extensive front.

This description of a battle position implies that it may consist of one or more regimental sectors, each occupying a portion of the main line of resistance. The width of the battle position is determined by the number and width of the regimental sectors occupied, whereas the depth is measured from the main line of resistance rearward to include the area occupied by the regimental reserves, known as the regimental reserve line.

Our triangular organization lends itself to a two-one defense, that is, two subordinate units in defense of the main line of resistance and one subordinate unit in support or reserve. Therefore, we usually find two infantry regiments holding sectors on the battle position, while one regiment is held in division reserve. Within the infantry

regiment we usually assign two infantry battalions to front-line defense areas and one battalion to regimental reserve. In the infantry battalion we usually place two rifle companies in defense areas on the main line of resistance and one rifle company in battalion reserve. In the rifle company it is customary to employ two rifle platoons to occupy defense areas on the main line of resistance, and one rifle platoon in the company support area.

This type of distribution will fit most defensive situations, but we must always keep in mind the maxim that *there are no set rules in tactics.* Each tactical plan must be predicated on the mission assigned, the terrain involved, and the special situation presented by the relative combat efficiency of both the enemy and friendly troops. These factors may dictate a departure from the usual practice.

The battalion defense area is the primary organization upon which our present system of defense is based. The battalion is equipped to enable it to occupy and defend an area. Therefore, the infantry battalion is the yardstick by which higher commanders estimate their ability to occupy and defend a battle position. Within the infantry battalion the rifle platoon is the unit of measure.

The frontage that can be defended by a unit depends upon the ability of its elements to defend the front and flanks by fire and counterattack, and the leader's ability to control his subordinate elements during combat. The width of the assigned frontage should be governed by the type of terrain encountered. For instance, a wide frontage is normally associated with good observation and effective fields of fire, while a narrow frontage is the result of a combination of close terrain, poor observation, and avenues affording cover and concealment which favor the approach of the enemy. Width alone is of minor importance and cannot be used as a yardstick to determine the tactical employment of units on the battle position. The particular type of terrain, whether close or open, will influence the effectiveness of observation, fire power, control, and the likelihood of hostile approach. Therefore, the terrain, the frontage,

and the available fire power will determine the disposition of troops on the battle position.

The battle position is divided laterally into sectors of responsibility by designating boundaries and limiting points. Because of the static nature of defensive combat, boundary lines are more rigidly adhered to than in offensive operations. Boundary lines define the lateral limit of responsibility, fix definitely the area within which a unit will confine its activities, and assure unified control in the defense of a tactical locality. Limiting points are designated by the next higher echelon to indicate the general trace of the main line of resistance and to insure mutual support and coordination along the boundary between units. They need not be considered as absolute, but rather as locations on the ground where adjacent commanders will cooperate in the coordination of their defensive dispositions and fires in order that there will be no point of weakness in the defensive front.

Terrain, other than level ground, is generally partitioned by corridors leading into the position, by cross-compartments paralleling the front, or by a combination of both. The attacking force seeks a corridor leading into the hostile position which will assist in seizing a decisive objective, whereas a cross-compartment usually implies a combination of terrain factors favorable to the defense. The cross-compartment enables the defense to establish mutually supporting fires across its length and permits the retention of the dominant observation of the area.

Boundaries between tactical units in the attack should coincide with the boundaries of corridors. (See FM 101-5, Appendix II, Figure 1). The reasons are fundamental; the mission implies full authority to control a given area and the ridge on each side of a valley corridor affords essential observation. In the defense, boundaries are usually located within corridors, because the defense is built around a series of tactical localities facilitating all-around defense. These localities generally include the high ground which gives observation of the enemy's approach. Such an area should be assigned to a single unit, the boundary being placed between the crest and the valley (see FM 101-5,

Appendix II, Figure 2) and making the defense of a tactical locality the sole responsibility of one commander.

Corridors entering a defensive position break it up so that flat-trajectory fire used to defend one corridor cannot be used to assist in defending any other part of the position. Corridors, therefore, constitute a weakness in the defensive position by decreasing the flexibility of fires. The strength of a corridor to the attack, or conversely, the degree of weakness to the defense, is determined by its width and depth, its capacity to accommodate troops and afford defilade from flanking fires, and its extent into the defensive position. The boundaries of units in defense should neither divide tactical localities, nor follow the lines of probable enemy approach. The control of avenues of hostile approach into a position is a vital consideration in the location of boundaries. The unit that is most threatened should be given the complete control of a corridor leading into a particular area. In the defense, boundaries should always be located so that there is no question as to responsibilty for the defense of terrain features which dominate a critical avenue of enemy approach.

The location of the main line of resistance, that line upon which the infantry commander plans to coordinate his defense, may be unfavorable from some points of view, yet necessitated by other requirements. A forward slope position is desirable from the standpoint of observation and the delivery of fire, yet in order to avail himself of natural tank obstacles or concealed defilade, the commander may be forced to accept shorter and less favorable fields of fire. The dominant factors influencing the detailed trace of the main line of resistance and the order of their relative importance may be listed as (1) observation (by both the defending force and the enemy), (2) location of natural obstacles, (3) suitable fields of fire for infantry weapons, and (4) concealed defilade.

The defending force seeks to see while remaining unseen. The main line of resistance should cover terrain features essential to observation of the area in front of the position and should deny to the enemy facilities for observation into the position.

Obstacles aid the defense by hindering the movements of the attacking force. In the past, fields of fire and observation were the important considerations in selecting a defensive position. Today, a commander must give high priority to the defensive possibilities offered by the terrain and should take full advantage of natural obstacles which give protection against tanks.

The methodically prepared fires of the sustained defense seek to stop an enemy attack in place. In order to accomplish this it is essential that the defensive position have good fields of fire, especially at close range.

Concealed defilade which gives concealment from view, both aerial and ground, and cover from hostile fire, including protection from tank attacks, is always important and may be vital to the defense. Effective concealment makes surprise possible, without which the defense may be neutralized by artillery fire and aerial bombardment. Concealed defilade within the battle position facilitates communication, supply, and evacuation.

While regimental and battalion reserves are usually held mobile with counterattacks as their primary mission, they are also assigned other missions. All organized areas and mobile units within the battle position have a common reference line—the main line of resistance. One or more positions in depth may be required. In case of a deep penetration into an adjacent sector, reserves occupy flank lines of resistance facing the penetration to prevent its widening into an envelopment. The priority of organization of positions in depth and flank lines of resistance is stated in orders. Supporting weapons of reserve units are initially emplaced to fire in support of the main line of resistance, if practicable.

According to circumstances, a reserve unit may be employed:

1. As a mobile unit for counterattack against hostile elements penetrating the main line of resistance.
2. As a holding force extending in depth the zone of resistance, or for the occupation of flank lines of resistance to limit a hostile penetration to an adjacent area.

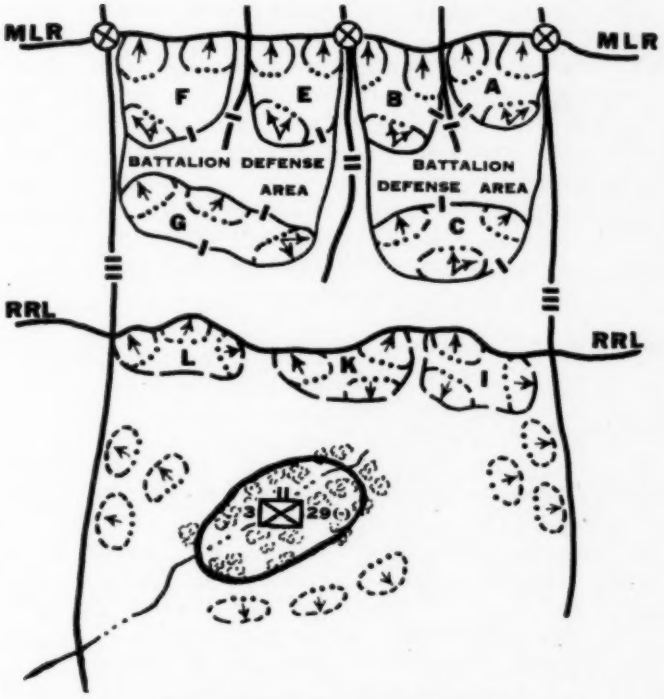


FIGURE 41.—Schematic organization of regimental battle position.

1. Within each platoon defense area, arrow points in principal direction of fire.

2. Positions organized by the regimental reserve to block penetrations from the flank(s) and to deepen the defense, are indicated by broken lines.

3. Where the situation indicates the likelihood of intensive bombardment by hostile combat aviation, or armored attack, the regimental reserve occupies selected defense areas, prepared to: *a.* Support forward battalions by the fire of its heavy weapons; *b.* Defend in place; *c.* Move to counterattack.

4. Where the situation indicates attack by infantry, supported by artillery, the heavy weapons of the regimental reserve, protected by small rifle detachments, are emplaced for the execution of prepared defensive fires. That part of the reserve not so engaged is hastily entrenched, if practicable, in a concealed, defiladed area within the area of the reserve, prepared to occupy its selected defense areas or move to counterattack.

3. To provide the security elements in front of the battle position.
4. To assist other units in the construction of emplacements, erection of obstacles, clearing fields of fire, laying antitank mine fields, or for other specific tasks.

The unit commander is charged with making the basic command decision of whether to employ his reserve for counterattack or to occupy previously prepared positions to limit a hostile penetration. Before making this decision, the commander should carefully weigh these considerations:

1. Counterattack is the decisive element of defensive action.
2. Counterattacks should be made only as the result of:
   a. An important locality being lost or threatened.
   b. A dangerous gap being opened.
   c. Fire alone failing to eject the enemy.
3. Conditions favorable to a counterattack are:
   a. The enemy has been stopped, slowed up, disorganized, or occupies an exposed position.
   b. Surprise is possible.
   c. Adequate reserves and supporting fires are available.
   d. The mechanized attack (if any) has left the area in which the counterattack force is to operate.
4. Local counterattacks by units smaller than a platoon are usually inadvisable if these units are in a position to support the action by fire from prepared positions.

A reserve unit commander should prepare plans for counterattack. These plans should be submitted to the next higher commander for coordination of supporting fires and for final approval. If possible, each counterattack plan should be rehearsed on the ground so that all phases of the plan can be executed without delay, confusion, or misunderstanding.

Thus far we have discussed briefly the principles and methods governing the employment of infantry units in defense. Let us now focus our attention on the *troop leading* phase which may confront an infantry commander in a defensive situation. A unit commander, when directed to

report to receive orders for the defense, should take with him certain individuals from his command group. Just whom the commander will take with him is a matter of his own choice, except that the second-in-command usually remains with the troops while the commander is away. The steps, or procedure which a unit commander follows in formulating his plan of defense and in moving his unit to the position selected are called *troop leading*. Chronological steps in troop leading are:

1. From a map study make a tentative plan of defense.
2. Direct the movement of the troops to the position.
3. Plan the ground reconnaissance and the coordination with commanders of adjacent units.
4. Announce the time and place for the issue of the defense order, and designate the personnel to be present to receive the order.
5. Check the tentative plan by a personal reconnaissance on the ground.
6. Complete the plan of defense so as to:
   a. Provide security.
   b. Coordinate the fire.
   c. Organize the ground.
   d. Plan counterattacks.
7. Issue the defense order.
8. Supervise the execution of the plan of defense.

We believe that our methods of defensive fighting are sound methods and the best with which a determined enemy in superior numbers can be met. From the time that the hostile advance first encounters the covering force, the enemy is kept under constant and increasingly effective fires as he approaches the battle position. The covering force conducts its action to delay and disrupt the enemy advance and to give early information of his formations and concentration areas. The covering force artillery and combat aviation attempt to disrupt the hostile attack before it gets under way. As the covering force withdraws, the attacking force next comes in contact with the general outpost. Fires from the outpost are opened at extreme

ranges, and thus the enemy is forced into an early development and time-consuming preparations for the attack. Ordinarily, the security elements withdraw only when forced to do so by hostile activity. As delay is the principal mission of security elements, they do not accept close combat, but withdraw along previously designated and reconnoitered routes before the enemy reaches assaulting distance. During the withdrawal, these elements occupy intermediate delaying positions and seize every opportunity to slow up the hostile advance. If the withdrawal of the general outpost is through the area of a front-line battalion, the combat outpost in that area will withdraw either with, or just prior to the withdrawal of the general outpost. In an area uncovered by the withdrawal of the general outpost, the combat outpost next acts as the buffer to the hostile advance. Its action is similar to that of the general outpost. Its withdrawal will, however, generally be made in one movement as the proximity of the combat outpost line to the battle position usually precludes the use of intermediate delaying positions. The withdrawal of the combat outpost should open up the front as quickly as possible in order to release the defensive fires of the battle position.

As the enemy comes within range, all weapons of the battle position sited for long-range fire open fire on remunerative targets. This includes the supporting artillery and howitzers of the cannon company, the rear machine guns and mortars of the forward battalions, and the heavy weapons of the reserve battalion. Weapons on the main line of resistance withhold their fires until the enemy comes within range of effective rifle fire—about 500 yards. Thereafter, the approach of the enemy is contested with all available weapons. As the enemy closes with the position, machine guns are switched to their final protective fires and barrages are laid down in the threatened area. Should the enemy succeed in penetrating the position, the defending force seeks, through fire and maneuver, to eject him. Supporting fires are concentrated on the penetrating elements, while local reserves, supported by the fires of all available weapons, strike the flanks of the gap to eject the enemy before he has had

time to establish himself. These local counterattacks are delivered without delay on the initiative of the local commander.

The defense of a battle position is thus conducted to combine the principles of deception, surprise, mobility, and aggression. All troops ahead of the main line of resistance, by their location and their employment of long-range fires and delaying action, deceive the enemy as to the actual location of the battle position, prevent his ground reconnaissance and observation of the position, and disorganize and delay his advance. The defense, no less than the offense, must effect surprise. Visible lines must not betray the defensive dispositions. The defense must maintain mobility. Mobility is gained by the use of covering forces, by improving the facilities within the battle position, by distribution of forces in depth, and by operating on interior lines. The conduct of the defense must be aggressive. It is seldom possible to hold a defensive position by passive resistance only. The counterattack is the decisive element of defensive action.

The defense of a battle position, as visualized today, is defense based on the main line of resistance supported by organization in great depth. This must include organized depth ahead of the line to disrupt the hostile advance, to inflict whatever losses it can, and to deceive the enemy as to the true nature of the defense; and depth in rear of the line to give flexibility to the defense, and to increase its mobility in restoring the position in case of penetration. All defensive action or maneuver by troops ahead or in rear of the main line of resistance is directed toward the absolute defense of that line. Under this system of defense, the resistance, like the coils of a spring, grows in intensity as the main line of resistance is approached. We can summarize our defensive teaching by saying that it concentrates its densest fires before the main line of resistance, uses hand-to-hand fighting where and when the enemy reaches the main line of resistance, and employs the sharp counterblow to eject him at any point where he penetrates that line.

"The infantry mission in defense is, with the support of the other arms, to stop the enemy by fire in front of the battle position, to repel his assault by close combat if he reaches it, and to eject him by counterattack if he succeeds in entering it." (FM 7-40, par. 234*b*.)

CHAPTER 6

Tactics
Regiment in Attack
Map Exercise

1. SITUATION.—*a.* Map A (figure 42).

b. Blue forces: A large Blue force, attacking from the northeast against intermittent opposition, has been stopped by strong enemy resistance along the line shown (in part) on Map A. There has been little air activity in the general area and major aerial operations in the near future are not expected. Elements of the Blue 9th Infantry (part of the 2d Division), at 1500, 22 March, occupy the line from a bridge at (41-32) (not on portion of map shown) to OAKDALE (43-30) (exclusive). The force commander has decided to renew the attack at daylight (0505), 23 March.

c. Blue 26th Infantry (part of 1st Division):

(1) At 1500, 22 March, combat elements of the Blue 26th Infantry are in assembly areas 2½ miles to the northeast.

(2) At this hour Colonel 26th Infantry at his command post near the regimental assembly area, receives the orders of Major General 1st Division for the attack, extracts from which, including the Division Artillery Annex, are as follows:

"For known enemy dispositions, see Operation Map. (Map A.)

"An artillery preparation will be fired from H-25 to H.*** Registration restricted to 1 howitzer per battalion prior to H-25. *** 7th FA Bn (105-mm how) direct support 26th Inf. *** 6th FA Bn (105-mm how) direct support 28th Inf. *** 5th FA Bn (105-mm how) general support and reinforce fires of 7th FA Bn. *** 8th FA Bn (155-mm how) general

support 1st Div; smoke Hill *587-a* (41-30) and Hill *562* (42-30) at H-2, maintain until ordered to lift. *** 691st FA Bn (105-mm how) general support and reinforce 7th FA Bn; 692d FA Bn (105-mm how) general support and reinforce the 6th FA Bn.

"1st Division, in conjunction with units on its right and left, passing through elements of 2d Division on its front, will attack and capture the high ground southwest of Turkey Creek (38-28).

"Time of attack, 0505, 23 March. For formation, zone of action, line of departure, regimental objective and initial CP, see Operation Map. (Map A.)

"26th Infantry will attack *** and capture the regimental objective.

"Axis of signal communication, 1st Div ***; 26th Infantry, see Operation Map."

(3) Shortly after receipt of the Division order, Lieutenant Colonel 7th Field Artillery Battalion reported to Colonel 26th Infantry.

(4) Colonel 26th Infantry, all members of his staff, and his battalion commanders have kept abreast of the situation during the action of 22 March by personal reconnaissance and reports from higher headquarters. They have maps similar to Map A, and have conducted a thorough map study of the area to their front in anticipation of the employment of the regiment in that area.

(5) After the receipt of the order of Major General 1st Division, Colonel 26th Infantry studies it briefly, makes a rapid map reconnaissance, and then issues the following orders to his staff, the members of which are assembled at the command post:

To Lieutenant Colonel Executive: "Major S-3, Major S-4, Lieutenant Colonel 7th Field Artillery Battalion, and I are going on reconnaissance to Hill *569* (42-32). Direct the battalion commanders to meet me there at 1630 prepared to receive my attack order. Have Lieutenant Liaison Officer "X" report to Division Headquarters at once and Lieutenant Liaison Officer "Y" report to the regiment of the 2d

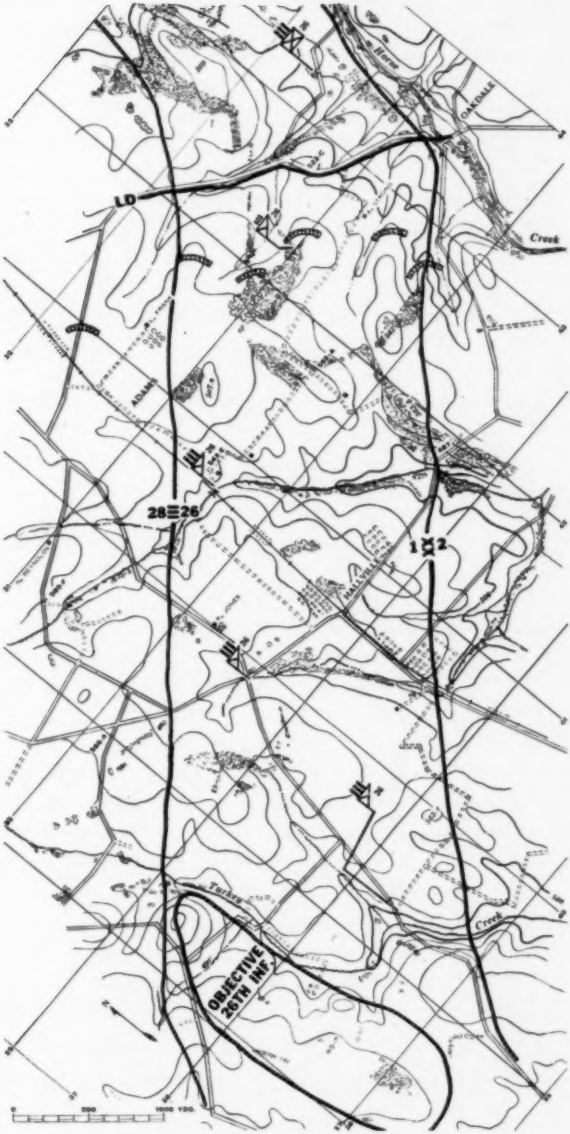


FIGURE 42.—Map A.

Division which will be on our left. Lieutenant Liaison Officer "Z" will remain at the regimental CP for the present.

"Captain Headquarters Commandant (CO Headquarters Company), since I have other work for S-1, proceed at once to the designated command post site (43-31), select the exact area to be occupied, make space assignments, and prepare plans for security of the command post. Captain Communication Officer will meet you there by 1715. Submit your plan for security to Major S-3 by 2000 tonight.

"Captain Antitank Company, Captain Cannon Company, and Captain Communication Officer report to me on Hill *569* not later than 1525.

"Major S-2, it is evident that our knowledge of the depth of the enemy dispositions is very sketchy. Undoubtedly he has already organized, or will organize and possibly occupy during the night, additional defensive localities in depth throughout our zone of action. Prepare an S-2 estimate to include all available additional information concerning the location of the hostile main line of resistance, any indications of enemy defensive work in depth in our zone, and indications of areas occupied by reserves and movements of troops. Prepare for my approval any request you may wish to make on division G-2. Join me on Hill *569* not later than 1525."

(6) En route to Hill *569* Colonel 26th Infantry discussed the situation with his accompanying staff officers. After arrival on the hill at 1515, the regimental commander studied the terrain and announced his decision, specifying that the initial formation for the attack would be two battalions in the attacking echelon and one battalion in reserve.

He then instructed Major S-3 as follows:

"You are familiar with the situation. Complete the preparation of a terrain analysis of the regimental zone of action and submit the results of this study to me here by 1535 today. At the same time give me your recommendation for the boundary between battalions."

2. FIRST REQUIREMENT.—*a.* The decision of Colonel 26th Infantry as to the mission to be assigned the battalions of the attacking echelon.

b. The terrain analysis of the regimental zone as made by Major S-3 to include the following:

(1) General configuration of the zone.
(2) Terrain corridors and compartments.
(3) Observation.
(4) Cover.
(5) Fields of fire and positions for supporting weapons.
(6) Obstacles.
(7) The boundary between battalions.

c. A study by Colonel 26th Infantry covering the following:

(1) An analysis of the probable organization of the enemy positions within the regimental zone of action to include the stream 2,000 yards southwest of the line of departure; and the subsequent areas at which Blue may encounter resistance between this stream and the regimental objective.

(2) Probable locations for enemy reserves and likely directions for enemy counterattacks during the attack of the 26th Infantry.

d. The steps, in general terms only, taken by Captain Headquarters Commandant to develop a plan for the security of the regimental command post.

3. A SOLUTION OF FIRST REQUIREMENT.—*a.* The decision of Colonel 26th Infantry as to the mission to be assigned to the attacking battalions:

(1) *The right battalion:* Every effort should be made by this battalion for the early capture of Hill *587-a* (41-30), the dominating terrain feature in the zone of this battalion, and indeed in the regimental zone for at least 3,000 yards from the line of departure. The terrain in the northern portion of this battalion zone is deficient in cover, and a strong attack there may be costly. More cover exists in the southern portion of the zone. An initial attack, advancing through the terrain corridor west of roadbend 522-C (42-31), and then moving toward Hill *587-a* from the east, through the woods, should have good chances of success after the position

southwest of roadbend 522-C is taken. The enemy organization southwest of Hill *587-a* is unknown. The plan of maneuver for this battalion beyond that point will have to be general in nature, and dictated by the subsequent development of the situation. This battalion will make the main effort of the regiment.

(2) *The left battalion:* Every effort should be made by this battalion for the early capture of Hills *562* (42-30) and *563-b* (41-29). A suitable terrain corridor, generally along the regimental left boundary and leading toward Hill *562*, is available for this purpose. With the main effort of the left battalion thus made at the greatest possible distance from the main attack of the regiment, the accomplishment of one of the major missions of the secondary attack battalion will be favored—the drawing of enemy reserves the maximum distance away from the main effort of the regiment. After occupying Hill *562*, the capture of the nose near RJ 562-A (41-30) and Hill *563-b* should be relatively easy. Beyond Hill *563-b* the plan of maneuver for this battalion will be dictated by developments.

b. Terrain analysis as made by Major S-3.

(1) Throughout the zone, except where interrupted by cross-compartments and ridges, the ground rises generally from about 500 feet at the line of departure to about 600 feet at the objective. The terrain along the regimental right (northwest) boundary generally dominates that along the left (southeast) boundary. From a tactical standpoint, the zone of action may be divided as follows: (a) the area between the line of departure and the first crest-line from Hill *587-a* to Hill *562;* (b) the area between the first crest-line and a second through HALLVILLE (40-29); (c) the area between the HALLVILLE crest-line and the line—CR 586-A (39-29) to Hill *543-c* (39-27); and (d) the area between this third crest-line and the objective.

(2) Each area listed above consists of a valley, or cross-compartment, approximately at right angles to the axis of advance, across which it is desirable to advance without halting until the next crest-line to the front is captured. The second, third, and fourth of these areas are very similar in

configuration, and consist of gentle downward slopes from one crest-line to a stream, and then a similar slope up to the next crest-line. Except for the presence or absence of cover, the attack through the last three of these areas will be uniformly difficult across the entire zone, since no terrain corridors are available. In the first area, however, the situation is otherwise. This area constitutes in itself a fair terrain corridor bounded on the northwest by Hill *587-a* and on the southeast by Hills *562* and *563-b* (41-29). Actually, it may be roughly divided into two subordinate corridors indicated by the stream west of roadbend 522-C (42-31), and the stream south of A. Strong (42-30). The directions of these corridors generally parallel the axis of advance and lead toward important initial terrain objectives.

(3) Observation over the first of these areas, as far as the general line: Hill *587-a*—Hill *562*, is available from Hill *569*. From the line: Hill *587-a*—Hill *562*, the observation is excellent as far as the line: R. Jones (40-29)—HALLVILLE and reasonably good beyond that line for another 1,000 yards. From the general line: CR 586-A (39-29)—Hill *543-c* (39-27) the observation is excellent as far as the regimental objective.

(4) Cover is not abundant. Most of that available initially is in the right (northwestern) half of the zone.

(5) Fields of fire are generally excellent. Suitable initial positions for infantry supporting weapons can readily be found on Hill *569*, and subsequent positions are available after the successive ridge lines are captured.

(6) There are no serious obstacles in the zone.

(7) *Boundary between battalions.*—It has been stated that most of the high ground in the zone, including most of the commanding observation, lies along the northwest boundary. Early capture of this terrain is desirable, and may make untenable the occupation of those areas lying along the southeast boundary. The cross-compartments become deeper as they approach the southeast boundary. Also, the cover is better in the northwestern half of the zone as far as Hill *587-a*. All of these factors favor a main attack in the northern portion of the zone. To permit the battalion

which is to make the main attack to exert its maximum power, the right (northwestern) battalion zone should be narrower than the left. No corridor wall exists throughout the zone along which to run the boundary between battalions, but the boundary may be drawn so as to skirt or pass through topographical features such as woods and roadbends. The boundary recommended is shown on Map B (figure 43). The initial attack of the right battalion against the nose east L. Frank (41-31) may be so difficult and costly that this battalion should be afforded an opportunity to take advantage of the terrain corridor west of roadbend 522-C and the patch of woods toward which this corridor leads. By utilizing this route of approach, this battalion should be able to control the southern slopes of the terrain corridor as far as the crest of the nose west of roadbend 522-C. The recommended boundary accordingly passes along this crest.

c. The study of Colonel 26th Infantry of the enemy defensive situation:

(1) The area between the line of departure and the general line: Hill *587-a*—Hill *563-b* is approximately 1,600 yards wide and 1,500 yards deep. It is probably occupied by the equivalent of one enemy battalion on the battle position. The located defense areas are either on his main line of resistance, or are those which were originally in the rear portions of his forward company areas. His regimental reserve elements are undoubtedly disposed to protect his essential observation on Hill *587-a* and on Hill *562*, loss of which will be a serious blow to him. Between this area and the general line: CR 586-A—(39-29) Hill *543-c* (39-27), extensive enemy organization is not to be expected. However, the Blue attack will probably be subjected here to opposition by small, scattered, defensive forces, presumably strong in machine guns, whose mission will be to delay the Blue advance pending the occupation of another defensive area farther to the southwest. Whether such an area is now organized is unknown, but it is believed probable that one will be established with its forward elements either along

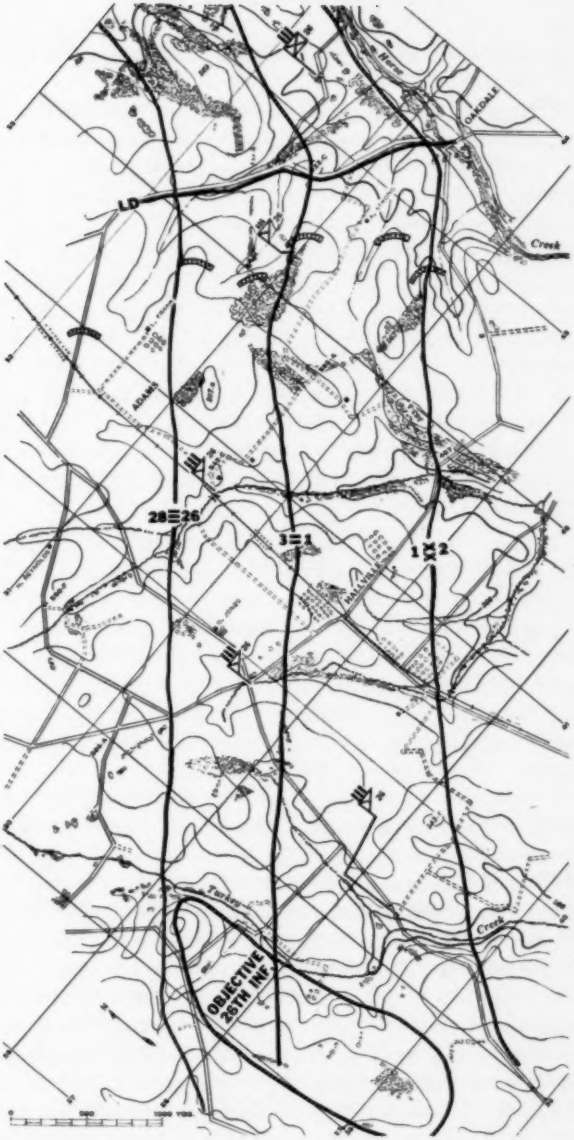


FIGURE 43.—Map B.

the general line: CR 586-A—Hill *543-c*, or more probably just southwest of *Turkey Creek*.

(2) Supports of front-line companies probably will occupy and defend prepared positions rather than execute local counterattacks. However, counterattacks by companies, or perhaps by a force as large as a battalion, may be expected as the Blue attack threatens Hills *587-a* and *562*. So essential are these terrain features to the enemy, that, if seriously threatened by Blue, he will probably employ local reserves from behind the battle position for counterattack. Suitable initial assembly areas for such reserves exist in the vicinity of RJ 580-F (39-30), near HALLVILLE, and just south of Hill *563-b* (41-29). Counterattacks by units as large as a battalion, directed toward Hill *587-a*, or across the saddle between that hill and Hill *562*, should be expected from the directions of RJ 580-F, HALLVILLE, and RJ 487 (41-29).

d. Steps taken by Captain Headquarters Commandant to develop his plan for the security of the regimental command post:

(1) Reconnaissance of the command post site to determine routes favorable for the approach of hostile ground and mechanized troops.

(2) Selection of locations for road blocks and other defensive positions from which to block these favorable approaches.

(3) Selection of a rendezvous point for the assembling of members of the command post personnel in case of attack, or threatened attack.

(4) Establishment of a warning system.

(5) Designation of personnel, both officers and men, to continue on normal duties in case of an attack—all others to participate in the defense of the command post.

(6) Selection of a site for the motor park for headquarters vehicles. Instruction to the headquarters company transportation sergeant for the defense of this park (using drivers of vehicles in the park).

(7) Arrangements for additional personnel—from intelligence and reconnaissance platoon (when not engaged

otherwise)—to assist in the operation of the warning system.

(8) Preparation of instructions to command post personnel to put the plan into operation.

4. SITUATION, CONTINUED. — Major S-2, Captain Antitank Company, Captain Cannon Company, and Captain Communication Officer joined Colonel 26th Infantry on Hill *569* at 1520. Major S-3 presented his study at 1535. The Colonel then spoke as follows:

"I plan tentatively to employ the 3d and 1st Battalions, right to left, in the attacking echelon; 2d Battalion in reserve. 3d Battalion initially will make the main attack and capture Hill *587-a*.

"Major (addressing Major S-3), in fifteen minutes give me your recommendations, with reasons therefor, for the initial employment of Company H and the antitank platoon of the 2d Battalion.

"Lieutenant Colonel 7th Field Artillery Battalion and I will discuss the plan of artillery fire support, using as a basis the plan of artillery support for the 9th Infantry, now in contact with the hostile main line of resistance. When we have reached a common understanding, and when the battalion commanders have submitted their request for artillery fire, copies of the plan will be issued in sufficient number for distribution to our battalion commanders. See that each concerned receives a copy.

"Captain Antitank Company, prepare your recommendations relative to the antimechanized defense for the regimental zone of action during the attack with particular reference to the employment of the antitank company weapons and coordination with battalion antitank weapons and the fires of the cannon company. Submit your recommendation to me, here, by 1605.

"Captain Cannon Company, submit your recommendation for the employment of your company to me, here, by 1610.

"Major S-2, after I have issued my order, inform me of your plan for the employment of the regimental intelligence and reconnaissance platoon.

"Captain Communication Officer, prepare your recommendations for paragraph 5 of the order and submit your recommendations to S-3, here, by 1615."

5. SECOND REQUIREMENT.—*a.* Analysis by Major S-3 in preparing his recommendations for the initial employment of Company H and the antitank platoon, 2d Battalion.

b. Analysis by Captain Antitank Company in preparing his recommendations for the employment of antitank weapons within the regimental zone.

c. Analysis by Captain Cannon Company in preparing his recommendations for the employment of his company.

d. The plan of Major S-2 for the employment of the intelligence and reconnaissance platoon.

e. The recommendations, and reasons therefor, of Captain Communication Officer for paragraph 5 of the regimental attack order.

NOTE:—For the purposes of this exercise it will be assumed that the Communication Officer will make his recommendations relative to signal communication and command posts without reference to those installations of elements of the 9th Infantry in the area.

A DISCUSSION OF A METHOD OF PLANNING AND FURNISHING ARTILLERY SUPPORT FOR THIS ATTACK.—As stated previously, Lieutenant Colonel 7th Field Artillery Battalion reported to Colonel 26th Infantry soon after receipt of the division order which placed his battalion in direct support of the 26th Infantry. However, the 7th Field Artillery Battalion remains under division control and hence has a secondary mission of being prepared to fire on division order. By retaining all the field artillery under division control it is possible for the division commander to use the fire of any part or all of the units of the division artillery where it will be most effective in assisting the accomplishment of the division mission. Since the division artillery, in terms of time, is the first reserve available to the division commander for influencing the action, he will always hold it under centralized control when time and space factors and communication permit.

Lieutenant Colonel 7th Field Artillery Battalion accompanied Colonel 26th Infantry on his reconnaissance in order that the general plan of artillery support might be discussed and coordinated as the regimental scheme of maneuver was formulated by Colonel 26th Infantry. The general plan of artillery support includes among other matters the following:

(1) *The artillery preparation prior to the attack:* The force commander decides whether a preparation is to be fired. All the artillery participates in the preparation. In the final phase of the artillery preparation all artillery except that needed to maintain the neutralization of hostile artillery is concentrated on the known enemy forward defenses. The infantry regimental commander should be informed of the amount of artillery available for fire on the hostile forward defense positions in the regimental zone of action in order that he may recommend that the fires of this artillery be so placed as to assure the neutralization of those known targets which most threaten his scheme of maneuver. In this situation the number and extent of located hostile positions in each battalion zone of action appear to be about equal; however the 3d Battalion is making the main effort of the regiment. Therefore it would appear advisable to recommend that, for the preparation, the fires of two of the three artillery battalions available to the regiment (7th Field Artillery Battalion reinforced by the 691st Field Artillery Battalion and the 5th Field Artillery Battalion) be placed on hostile positions in the zone of action of the 3d Battalion.

(2) *The determination by Colonel 26th Infantry as to the battalion that initially should be given priority on calls for artillery fire:* After the attack is launched, the neutralization obtained during the preparation should be maintained on the most critical positions until the advance of the attacking echelon masks that fire. The 3d Battalion should receive the support of most, or all, of the fire of the 7th Field Artillery Battalion during this period. The 5th or 691st Field Artillery Battalion, part of whose mission is to reinforce the fires of the 7th Field Artillery Battalion,

might be used during this period to maintain neutralization in the zone of action of the 1st Battalion. After the initial fires have been lifted the priority given the 3d Battalion on calls for artillery fires means that if both battalions call for artillery support at the same time, the 3d Battalion will receive the requested support.

The decision as to the number of batteries which are to fire on an area rests with the artillery battalion commander. His decision is based on technical considerations—primarily the nature of the target, area to be covered, observation, and the available communications. Since the hostile reaction to the attack can never be accurately predicted and since events will rarely occur as planned, priority on calls for artillery fire should be granted initially to that battalion whose effort is considered, before the attack, as the more important to the success of the regiment. After the attack is launched the regimental commander should be prepared to change priority on calls for artillery support if the situation requires it. Whenever both infantry battalions call simultaneously for artillery supporting fires on different targets, one or both of which require the fire of more than the direct support artillery battalion, the support is given to the infantry battalion which has priority; the artillery commander should notify the infantry regimental commander at once of the conflict in requests and request the desired fires from the reinforcing artillery.

(3) *The method to be used for lifting or shifting the artillery fire:* Normally, Colonel 26th Infantry and Lieutenant Colonel 7th Field Artillery Battalion determine whether this should be done on a time schedule, on call, or on signal. The difficulty of predicting at which time the attacking troops will reach an area in which they will be endangered by their own artillery fire makes a time schedule impossible under most conditions. The best method is by call, and provision should be made to use at least two normal channels of communication. Visual signals should always be provided for use in an emergency.

(4) *Areas, if any, where Colonel 26th Infantry desires that the artillery be prepared to mass all of its fire:* Normally, the 105-mm howitzer batteries are able to place their fire on any area in the regimental zone of action. If Colonel 26th Infantry decides that certain avenues are particularly favorable for enemy mechanized attack, or that there are certain localities from which a hostile counterattack might be launched, as a precautionary measure he should request that the 7th Field Artillery Battalion be prepared to mass all its fires in any of these areas.

(5) *The use of smoke:* Artillery smoke shell is normally fired by 155-mm howitzers, and requests for smoke will usually be transmitted to the division artillery commander. Colonel 26th Infantry may desire that smoke be used to blind hostile observation in his zone of action, or he may desire that smoke *not* be used, when wind or weather conditions are such that it would be more harmful than helpful to the maneuver of his battalions. He should inform Lieutenant Colonel 7th Field Artillery Battalion in order that his request may be included in the division artillery plan.

(6) *The general plan of artillery support:* When agreed upon by Colonel 26th Infantry and Lieutenant Colonel 7th Field Artillery Battalion, this plan is transmitted as a directive to the officer in charge of the artillery fire direction center, where the fires are actually prepared, coordinated, and directed.

In this situation 2d Division artillery supporting the 9th Infantry had many fires (concentrations) prepared in the zone of action which will be taken over by the 26th Infantry. These partial fire plans can be used by the 7th Field Artillery Battalion for planning purposes, since data have already been obtained.

Should Colonel 26th Infantry feel that the artillery available to him is insufficient to support his attack, his request for additional artillery support will be transmitted by Lieutenant Colonel 7th Field Artillery Battalion to the division artillery commander. In such case, if the necessary artillery is available, the division artillery commander

will provide for reinforcing the fires of the direct support battalion.

Lieutenant Colonel 7th Field Artillery Battalion, or his representative, should remain with Colonel 26th Infantry to maintain command liaison. To facilitate this vital function of command liaison, the artillery battalion command post should be located, at least initially, near the command post of the infantry regiment. Should it become necessary to separate them during the later stages of the attack, a wire line is extended to the new location of the infantry switchboard and another wire line is laid to an artillery telephone at the new location of the infantry regimental command post for the use of the artillery battalion commander or his representative with the infantry regimental commander.

6. A SOLUTION OF SECOND REQUIREMENT.—*a. Analysis by Major S-3 in preparing his recommendations for the initial employment of Company H and the antitank platoon, 2d Battalion:* The heavy weapons company of the reserve battalion may be temporarily detached for use on special missions, such as to support the leading battalions of the regiment in the early stages of the attack. However, it should not be employed at such distance from its battalion as to unduly delay or complicate its return to battalion control prior to the time the battalion is to displace or be committed to action. Nor should its initial employment involve extensive expenditure of ammunition unless provision is made for resupply prior to utilization of the company by its own battalion. For these reasons the initial position of the company should be in, or close to, the area in which its battalion will probably be employed, and to which sufficient ammunition can be transported.

Since in this situation the reserve will probably be utilized in the zone of the right battalion, Company H should preferably be employed in that zone. This factor, together with the desirability of assisting the main attack by all available fire power, the observation afforded by Hill *569*, and the ease of ammunition supply to initial firing positions,

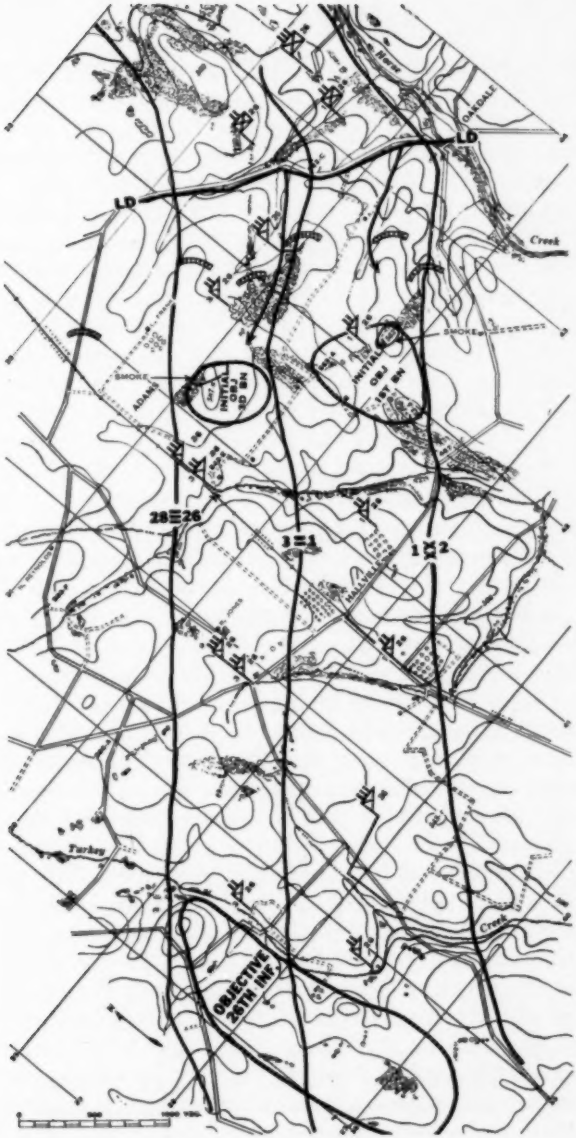


FIGURE 44.—Map C.

all indicate that positions on this hill should be recommended for this company. Both heavy machine-gun platoons and the 81-mm mortar platoon can well be employed. The fire of the heavy machine-gun platoons should be directed to be placed in support of the attack of the 3d Battalion, preferably on the enemy position 400 yards southwest of roadbend 522-C (42-31), until masked. The 81-mm mortar platoon is capable of maintaining a smoke screen on the two known organized locations in the zone of the 3d Battalion for a period of four minutes and should be prepared for such mission. If it is desired to have this smoke screen last longer, additional ammunition can be brought up during the night. The company should revert to the control of its battalion when fires from initial positions are masked, since any forward displacement would remove it too far from control of its own battalion.

There is no reason at this stage of the action for employing the antitank platoon of the 2d Battalion to assist in protecting the advance of the leading battalions. This platoon may be used to better advantage in protecting the assembly area of its own battalion.

b. Analysis by Captain Antitank Company in preparing his recommendations for the antimechanized defense of the regimental zone of action during the attack: In the absence of information indicating a possible hostile counteroffensive, no serious enemy reaction involving the employment of mechanized elements need be expected during the earlier stages of the attack. *Horse Creek* (43-31) serves as an effective barrier on the east, initially. Terrain on the northwest flank of the regimental zone of action is more favorable for hostile mechanized operations. The employment of the antitank platoons of the battalions in the attacking echelon, together with antitank weapons of elements of the 9th Infantry in contact with the enemy, will be sufficient to protect the area of departure.

The antitank company during this initial stage may be held in a position of readiness in rear, with reconnoitered and previously selected cover positions and firing positions on the south and western slopes of Hill *569* to which the bulk

of the company may be advanced immediately on call. As the forward hostile positions are captured, some reorganization of rifle units may become necessary. At this time, some of the guns of the battalion antitank platoons may be displacing forward and for this reason some guns of the antitank company should be in cover positions or firing positions on the south or western slopes of Hill *569* while the battalion guns are being advanced.

As the attacking echelon approaches, or after it has captured, Hills *587-a* and *562*, the major hostile mechanized reaction may be anticipated in connection with hostile counterattacks launched to retain or regain these important terrain features. Assuming that both battalions of the attacking echelon have captured these objectives, it can also be assumed that their antitank platoons will either be displacing forward to, or actually in position on, Hills *587-a* and *562*. Assuming all guns to be in position, they would be inadequate to cover effectively the regimental zone in both width and depth.

If a hostile mechanized counterattack develops, it is probable that its mass will be directed against Hill *587-a*, where not to exceed three battalion antitank guns will be in position. It is evident that additional antimechanized protection is essential. At the earliest opportunity one platoon of the antitank company should be advanced to Hill *587-a* prepared to reinforce the antimechanized defense of that area. With one platoon remaining in firing position, or cover position, on the forward slope of Hill *569* and one platoon being advanced on the left flank of the regimental zone to occupy positions on Hill *562*, depth will be provided in the event of a hostile attack against Hill *587-a* from the south, southwest or west.

c. Analysis by Captain Cannon Company in preparing his recommendations for the employment of his company: The platoons of the cannon company should be disposed to enable them to support both of the battalions of the attacking echelon. However, since the 3d Battalion is making the main effort of the regiment, most of the cannon company's howitzers should be available to fire on suitable targets in

support of that battalion. Positions on the southwest slopes of Hill *569* will permit accomplishment of both of these missions during the initial action. As the attack approaches Hills *587-a* and *562*, the cannon company should be prepared to displace its platoons promptly to positions on those hills, still with a view to directing most of its fire power to support the right battalion.

d. Plan of Major S-2 for the employment of the intelligence and reconnaissance platoon: To have part of one squad make contact at once with any intelligence personnel of the 9th Infantry that is operating observation posts in the zone of action of the 26th Infantry. This detail to be relieved at dark. Part of one squad to reconnoiter immediately that part of *Horse Creek* crossing the zone of the 26th Infantry (area northeast of that shown on Map A, figure 42) and secure detailed information of any possible vehicle routes across this stream. The platoon, less elements engaged on intelligence missions, to be held mobile in the vicinity of the regimental command post and to be employed as the situation dictates after the attack is launched.

e. Recommendations and reasons therefor of Captain Communication Officer for paragraph 5 of the regimental attack order: A suitable location for the initial command post of the 1st Battalion is the edge of the woods at (43.15-31.30). Another location considered satisfactory is the clump of trees immediately south of the roadbend at (43.2-31.5). The point designated in the field order should be easily located on the ground as well as on the map.

In the zone of action of the 3d Battalion there is no ideal location for the initial battalion command post. A command post on the north slope of Hill *569* is too far to the rear; if it is placed on the south (forward) slope, it will be subject to enemy fire. However, trees afford concealment at several locations on the forward slope approximately in the center of the battalion zone of action.

Wherever practicable, points on the battalion axis of signal communication should afford defilade and covered routes of communication; as in the case of the initial battalion command post, they should be approximately in the

center of the battalion zone of action in order to equalize messenger distance to the companies, and to facilitate control.

Captain Communication Officer therefore recommends that initial command posts and the axis of signal communication for the attacking battalions be as shown on Map C (figure 44).

7. SITUATION, CONTINUED.—*a.* Major S-3 submitted his recommendations to Colonel 26th Infantry on Hill *569* at 1550.

b. Colonel 26th Infantry then instructed Major S-4 to submit recommendations for the supply plan for the attack. Upon receipt of these recommendations, Colonel 26th Infantry made all necessary adjustments to improve coordination with other plans for the regiment and then approved the supply plan.

c. Colonel 26th Infantry approved the recommendations submitted by Captain Antitank Company, Captain Cannon Company, and Captain Communication Officer.

d. As the battalion commanders arrived on Hill *569*, Major S-3 informed them of the situation, oriented them on the ground, and issued each a copy of an operation map (figure 44). At 1630, Colonel 26th Infantry issued the following oral order to the officers assembled on Hill *569:*

"Take notes.

"You are familier with the situation.

"The 7th Field Artillery Battalion will support our attack. Commencing at 0440 the artillery will place concentrations on the known hostile positions shown on your map (figure 44). The 8th Field Artillery Battalion will smoke Hills *587-a* and *562* as shown on the map, commencing at 0503 until ordered to lift.

"This regiment, moving into assembly positions along *Horse Creek* commencing at 2030 tonight, will pass through the 9th Infantry and attack at 0505, March 23. For formation, boundaries, line of departure, initial plan of maneuver of attacking battalions, and objectives, see operation map (figure 44).

"The antitank company will remain in a position of readiness initially in the draw northeast of Hill *569*. Immediately upon capture of the hostile forward positions by the attacking echelon, not less than two platoons will move to cover positions on the southwest slopes of Hill *569*, prepared to reinforce the antimechanized defense of 3d and 1st Battalions, with particular attention to the right flank of the regiment. As the attacking echelon approaches the general line: Hill *587-a*—Hill *562*, the antitank company will furnish maximum protection for that line from positions on the flanks of the regimental zone, with particular attention initially to the support of the 3d Battalion.

"Cannon Company will occupy positions in the woods on the southwestern slope of Hill *569* prepared to support the initial phases of the attack. Prompt displacement to positions on or near Hills *587-a* and *562* will be made upon capture of those hills, with two platoons in support of the 3d Battalion.

"Company H, from positions on Hill *569*, will support the attack of the 3d Battalion as follows: Fire of heavy machine-gun platoons, initially, will be placed on hostile position 400 yards southwest of roadbend 522-C; when fires are masked, the platoons will shift to the hostile position 500 yards east of L. Frank. The mortar platoon, commencing at 0504, will smoke the hostile position 500 yards southwest of roadbend 522-C and the hostile position in the left (southeast) half of the 3d Battalion zone to the limit of its smoke ammunition; thereafter it will support the 3d Battalion by firing on suitable targets. When the fires of Company H are masked, it will revert to its own battalion.

"Priority on calls for artillery fires to 3d Battalion. Artillery fires will be lifted on call or on green chain parachute signal from the attacking battalions.

"Battalion assembly areas as indicated on operation map. (Area not included in figure 44.) Routes thereto and in advance thereof to the line of departure will be reconnoitered before dark.

"Administrative details later.

"Axes of signal communication—see operation map.
"Are there any questions?
"It is now 1645. Move out."

8. SITUATION, CONTINUED.—*a. The 1st Battalion.*—This battalion attacked with Companies B and C, right to left, in the attacking echelon and Company A in reserve, making its main attack on its left. The forward hostile positions were captured with considerable difficulty, but additional organized positions were encountered on Hill *562* and near RJ 562-A (41-30). The trees in the vicinity of RJ 562-A are deciduous second growth, and not more than 20 feet high. They provide concealment but do not greatly restrict observation of Hill *562* from Hill *587-a*. Company B suffered so severely in the attack that it was reconstituted as the battalion reserve, Company A being committed on the right of the battalion.

b. The 3d Battalion: This battalion attacked with Companies K and L, right to left, in the attacking echelon and Company I in reserve. Receiving effective fire support, the attack proceeded as planned, and at 0715, Hill *587-a* was captured.

c. Commanders and staffs: At 0730 Colonel 26th Infantry, Lieutenant Colonel 3d Battalion, certain members of their staffs, Captain Antitank Company, Captain Cannon Company, and Lieutenant Colonel 7th Field Artillery Battalion are in the southeastern corner of the woods on the north slope of Hill *587-a*, from which point the entire zone of the 3d Battalion, and parts of the zone of the 1st Battalion are visible.

d. Colonel 26th Infantry has just received the following combat reports and sketch from the commanders of the 1st and 2d Battalions: (See figures 45, 46 and 47).

e. The commander of the 3d Battalion has reported as follows to Colonel 26th Infantry:

"Companies K and L, right to left, are reorganizing on the south and southwestern slopes of Hill *587-a*, preparatory to resuming their advance.

"Company I has not been employed. It is awaiting orders in the woods at (41.8-31.0), 600 yards east of Hill *587-a*.

"Company M is in position east and southeast of Hill *587-a*, covering the reorganization of the companies of the attacking echelon and is prepared to support their advance.

"The battalion antitank platoon has one squad in position on the northwest slope and two squads on the southeast slope of Hill *587-a*."

f. Captain Antitank Company has reported as follows to Colonel 26th Infantry:

"My platoons are disposed as follows:

"One in cover positions in the northeastern corner of these woods.

"One displacing forward from Hill *569* to positions near the edge of woods at (41.6-30.8).

"One in cover positions in the vicinity of roadbend 522-C, prepared to move to positions on Hill *562* when that hill is captured."

g. Captain Cannon Company has reported as follows to Colonel 26th Infantry:

"One platoon has just occupied positions in the southern edge of the woods at (41.8-30.9) and is engaging suitable targets in the zone of the 1st Battalion.

"One platoon is displacing to cover positions in the western edge of the woods at (41.7-31.0).

"The remaining platoon is in firing position in the edge of the woods 200 yards northeast of roadbend 522-C, engaging suitable targets in the zone of the 1st Battalion."

h. Lieutenant Colonel 7th Field Artillery Battalion has reported that concentrations are being fired on Hill *562* and near RJ 562-A.

i. The situation in the regimental zone is known to all officers present.

9. THIRD REQUIREMENT.—Orders and requests of Colonel 26th Infantry at 0730.

COMBAT REPORT

2d BN 26TH INF
ORGANIZATION

0715 TIME 23 MAR DATE

1. Where are you?
In assembly area 400 yards northwest RJ 505 (+2-31)

2. What are you doing?
Waiting orders

3. Who is on your right?

4. Who is on your left?

5. How many casualties have you?
Very few

6. Are you receiving:
Artillery support? No
Machine-gun support? No
Infantry mortar suport? No-

1. Where is the enemy?
To the southwest

2. What is he doing?
?

3. What weapons is he using against you?
Some artillery

4. What hostile organizations have you identified?
None

5. Have you captured any prisoners or documents? No
Where are they?

Remarks:

Y
Lt Col
NAME

(OVER)

FIGURE 45.

COMBAT REPORT

1st Bn 26th Inf
ORGANIZATION

0715 MAR 23
TIME DATE

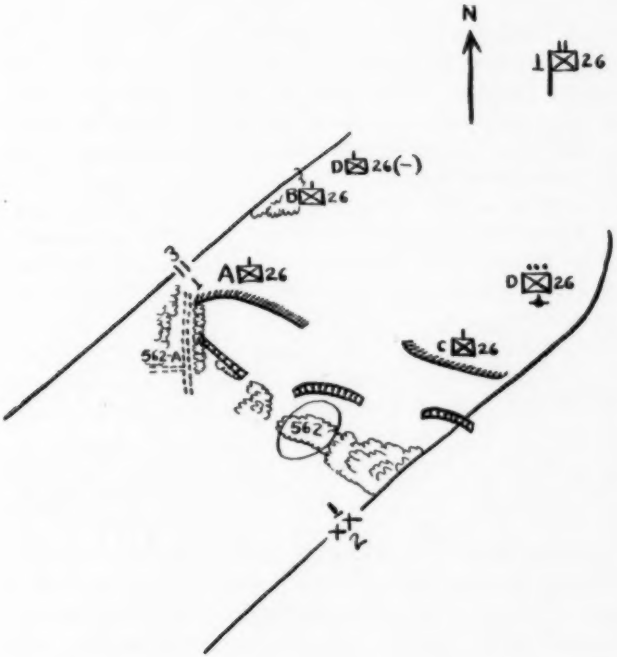
1. Where are you? See sketch	1. Where is the enemy? See sketch
2. What are you doing? Held up	2. What is he doing? Holding strongly
3. Who is on your right? 3d Bn	3. What weapons is he using against you? all infantry artillery
4. Who is on your left? 2d Div	4. What hostile organizations have you identified? Cos F and G 339th Inf
5. How many casualties have you? About 10%	5. Have you captured any prisoners or documents? Yes 5 Prisoners Where are they? Sent to your CP
6. Are you receiving: Artillery support? Yes Machine-gun support? Yes Infantry mortar suport? Yes	

Remarks:

X
NAME
Lt Col
RANK

(OVER)

FIGURE 46.



Sketch to accompany combat report 1st Bn 0715

Note: Co B reorganizing. Badly shot up. All other units in action.

X

FIGURE 47.

10. A SOLUTION OF THIRD REQUIREMENT.—At 0730, Colonel 26th Infantry issued the following orders and made the following request:

To Lieutenant Colonel 3d Battalion: "Assist the attack of the 1st Battalion by employing your reserve company at 0800 to attack the west flank of the hostile position near RJ 562-A. Limit the advance of this company to the unimproved road running west from RJ 562-A in the direction of RJ 542-E. I will notify the 1st Battalion, and arrange for all possible fire support."

To Captain Cannon Company: "Have two of your platoons prepare to support the attack of the reserve company of the 3d Battalion by engaging suitable targets near RJ 562-A. The platoon near roadbend 522-C will continue on present missions."

To Lieutenant Colonel 7th Field Artillery Battalion: "Place all available artillery fire on the enemy positions near RJ 562-A from 0750 to 0800. At 0800, shift to Hill *563-b*."

To Major S-3: "Contact Lieutenant Colonel 1st Battalion and notify him of my plan. Direct him to resume the attack in his zone at 0800."

11. SITUATION, CONTINUED.—*a*. At 0740, an enemy force estimated to be a battalion of infantry counterattacked from the vicinity of RJ 487 (41-29) and advanced to the northwest toward Hill *587-a*. When the enemy infantry had progressed to a point west of the roadbend at (41.7-30.0), a company of enemy tanks passed through its leading wave and moved rapidly toward Hill *587-a*. Although suffering severe losses from Blue antitank and cannon fire, a few tanks reached the southern slope of the hill and overran two of the guns of the 3d Battalion Antitank Platoon. One platoon of the antitank company while displacing to firing positions from its cover positions in the northeastern corner of the woods on Hill *587-a*, was destroyed by enemy artillery fire. Company L was badly disorganized, suffered severely, and was driven into the woods on the north slope of Hill *587-a*. Company I, moving into the woods 300 yards northwest of RJ 562-A, en route to its attack position, deployed

on the west edge of those woods and opened fire on the enemy counterattack. This fire, combined with that of Company K and Company M, stopped the enemy infantry advance along the road: RJ 562-A—RJ 542-E (40-30). The few remaining tanks withdrew to the south.

b. During the action, Lieutenant Colonel 3d Battalion and Captain Antitank Company were killed, and Lieutenant Colonel 7th Field Artillery Battalion was wounded. Present with Colonel 26th Infantry on Hill *587-a* are Major S-3, 7th Field Artillery Battalion (who accompanied his battalion commander) and a motor messenger and radio operator with a vehicular radio set from the Communication Platoon 26th Infantry.

c. The regimental command post is in its initial location.

d. At 0815, Major S-3 26th Infantry returned from his mission to the commander of the 1st Battalion and joined Colonel 26th Infantry. After being informed of the situation, he reported as follows:

"I joined Lieutenant Colonel 1st Battalion at 0740 and delivered your orders concerning the resumption of the attack. These were promptly transmitted to Companies A and C, and preparations were made to support their attack with the fire of Company D. Shortly thereafter we could hear increased firing to the west and southwest and concluded that the enemy was counterattacking, although we could not see the action because of the intervening high ground. At 0800 Companies A and C resumed their attack but were unable to effect a material advance. While the reorganization of Company B has been completed, this unit is at reduced strength, and I do not believe that much can be expected of the battalion unless the resistance on its front can be reduced."

e. At 0820 Major S-2 26th Infantry joined Colonel 26th Infantry and reported as follows:

"The enemy is holding strongly in the zone of the 1st Battalion; his positions on the front of the 2d Division on our left are still intact. The enemy battalion which counterattacked evidently suffered severely during its advance. It is now engaged in a fire fight with our Companies I and K

and I believe it is holding its present position with some difficulty. Enemy machine guns in the woods on the west slope of Hill *563-b*, and in the stone house 300 yards south of RJ 562-A are firing in support of their counterattacking units. Enemy riflemen are firing from the house just south of RJ 542-E and the house near the roadbend 250 yards southeast of RJ 542-E."

f. At 0825 a messenger from the right regimental connecting group delivered the following message; "Left flank of forward elements of 28th Infantry at 0810 rested on railroad about 400 yards south of ADAMS. Apparently halted for reorganization."

g. No other reports of regimental units have been received by Colonel 26th Infantry up to 0825.

12. FOURTH REQUIREMENT.—Actions and orders of Colonel 26th Infantry at 0825.

13. A SOLUTION OF FOURTH REQUIREMENT.—At 0825 Colonel 26th Infantry issued the following orders:

To Major S-3: "Contact the Battalion Executive 3d Battalion immediately and direct him to report to me here at 0900. Inform him of located enemy machine guns on west slope of Hill *563-b*. Ascertain the exact location and condition of all companies of the 3d Battalion and units of the Antitank Company. Report to me here with First Lieutenant Antitank Company (second-in-command of that unit) by 0900."

To Major S-2: "Notify my executive officer of our situation and direct him to transmit the report to Division. Direct him to have Lieutenant Colonel 2d Battalion report to me, here, at once."

To Major S-3, 7th Field Artillery Battalion: "Have artillery concentrations placed on known locations of hostile counterattacking units along and south of the road: RJ 562-A—RJ 542-E."

To Captain Cannon Company: "Destroy the hostile machine guns in the stone house 300 yards south of RJ 562-A and hostile elements in the houses south and southeast of RJ 542-E. The platoon near roadbend 522-C will continue on present missions."

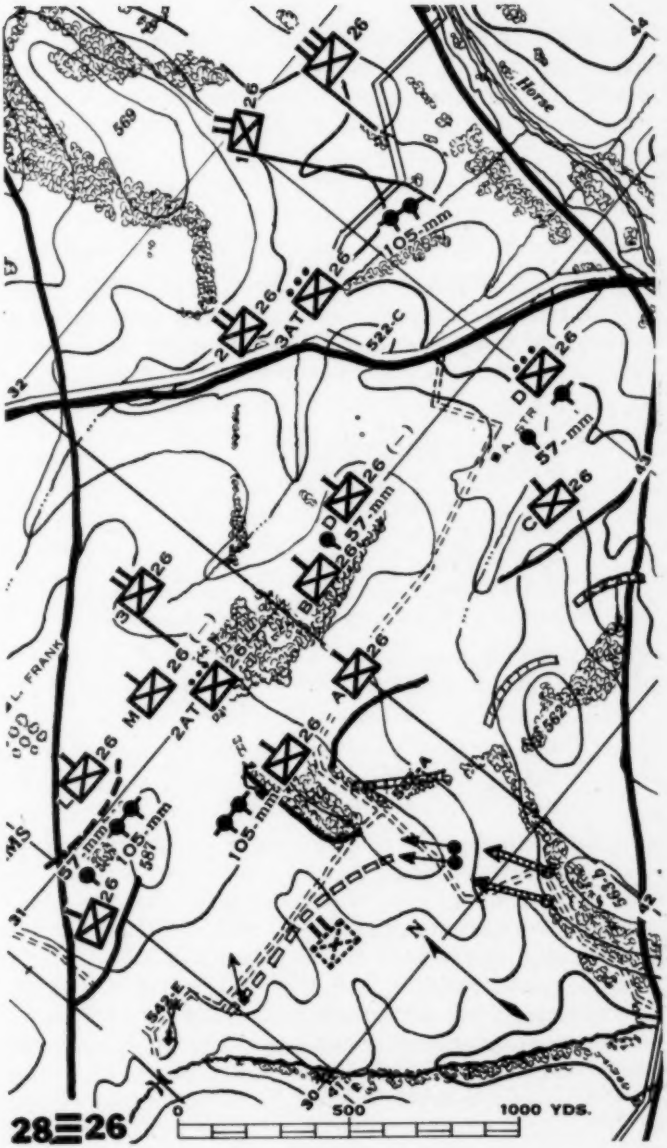


FIGURE 48.—Map D.

14. SITUATION, CONTINUED.—*a.* By 0850 the regimental staff officers had complied with their instructions. Based upon their knowledge of the situation, these officers prepared a unit situation map with data as of 0900, which is now in the hands of Colonel 26th Infantry (see Map D, figure 48). He and the party with him are aware also of the following:

(1) *Enemy:* No change as to strength, dispositions, or condition from that reported by Major S-2 at 0820.

(2) *Blue.* (a) Advance elements of the 28th Infantry have reached the stream east and southeast of N. Reynolds (39-30), and are advancing slowly to the southwest.

(b) *1st Battalion:*
Casualties: Estimated 20%.
Ammunition: 50% normal.
Heavy machine guns: 6.
81-mm mortars: 3.
Antitank guns: 2.
Company weapons: about 75% normal.
Reserves: Approximately ⅔ of Company B.

(c) *2d Battalion:*
Casualties: 1%.
Ammunition: Normal.
Heavy weapons: Normal.
Company weapons: Normal.
Miscellaneous: Not yet engaged.

(d) *3d Battalion:*
Casualties: Estimated 15%.
Ammunition: 60% Normal.
Heavy machine guns: 7.
81-mm mortars: 4.
Antitank guns: 1.
Company weapons: about 80% normal.
Reserves: Approximately ½ Company L—not immediately available.
Miscellaneous: Companies I and K capable of immediate further effort.

(e) *Antitank Company:*
Casualties: Estimated 20%.
Ammunition: 60%.
Antitank guns: 6.

(f) *Cannon Company:*
Casualties: 5%.
Ammunition: 40% normal.
105-mm howitzers: 6.

(g) All available artillery fire is falling on known enemy positions along and south of the road: RJ 562-A—RJ 542-E.

(h) Other items, no change from report of Major S-3 at 0815.

b. Major Executive 3d Battalion, now commanding the 3d Battalion, Lieutenant S-2 3d Battalion, Major S-3 26th Infantry, and 1st Lieutenant Antitank Company have reported as ordered Captain Cannon Company, Major Executive 7th Field Artillery Battalion (now commanding that battalion), Lieutenant Colonel 2d Battalion and party, and certain enlisted assistants of the regimental commander are also with Colonel 26th Infantry on Hill *587-a* at 0900.

15. FIFTH REQUIREMENT.—Plan, as of 0900, of Colonel 26th Infantry, with reasons therefor, for the resumption of the attack by his regiment.

16. A SOLUTION OF FIFTH REQUIREMENT.—*a.* The situation in the 1st Battalion zone has not materially altered since 0730. The situation in the 3d Battalion zone is quite different. Company L is temporarily out of the picture. Neither Company I nor Company K can resume an advance to the southeast until the enemy battalion which counterattacked is disposed of; the combined companies are not sufficiently strong, nor are they suitably disposed, to attack this battalion. Furthermore, Company I should not be required to readjust its dispositions so as to attack the hostile positions near RJ 562-A as originally ordered. Since neither of the attacking battalions can advance, the time is ripe to employ the fresh 2d Battalion which has thus far been held as regimental reserve.

b. This battalion may be employed in the zone of the 1st Battalion. This is undesirable, since it will run into strong opposition and at best can only attack frontally because the situation precludes maneuver. It may be employed in the zone of the 3d Battalion, passing through Companies K and I in an attack to the southeast. This is undesirable because it will be subjected to flanking fire from enemy positions south of the road: RJ 562-A—RJ 542-E and from Hill *563-b*. It may be employed across the zones of both battalions of the attacking echelon, in the direction of the line: Hill *587-a*—HALLVILLE. If so employed, the attack of this fresh battalion, advancing downhill supported by the fires of supporting weapons and elements of the 3d Battalion, should be able to dispose quickly of the enemy positions and seize an area near HALLVILLE from which it will be in a position to continue the advance later in the zone of the 1st Battalion. Hostile observation and fires from Hill *563-b* may be neutralized by fire or smoke. Upon the capture of HALLVILLE the enemy positions in the area: Hill *562*—RJ 562-A—Hill *563-b* can be taken from the rear, if the enemy still holds in that area.

c. Colonel 26th Infantry therefore decides to have:

(1) 2d Battalion attack at 1030 in the direction: Hill *587-a*—HALLVILLE, capture HALLVILLE, and continue the attack in the zone of action of the 1st Battalion.

(2) 3d Battalion to hold the enemy in its front by fire, and then to assist the attack of the 2d Battalion by fire. 3d Battalion to be prepared to continue the attack in its own zone.

(3) 1st Battalion to resume the attack at 1030, capture the area: Hill *562*—RJ 562-A—Hill *563-b* and thereafter await orders in that area in regimental reserve.

(4) One platoon of the Antitank Company to provide antimechanized protection to the south and southeast from the vicinity of Hill *587-a*. The platoon now in the vicinity of roadbend 522-C to be advanced to the west of Hill *587-a* to cover hostile approaches from the west and northwest.

(5) One platoon of the Cannon Company to support the attack of the 2d Battalion; this platoon to provide close

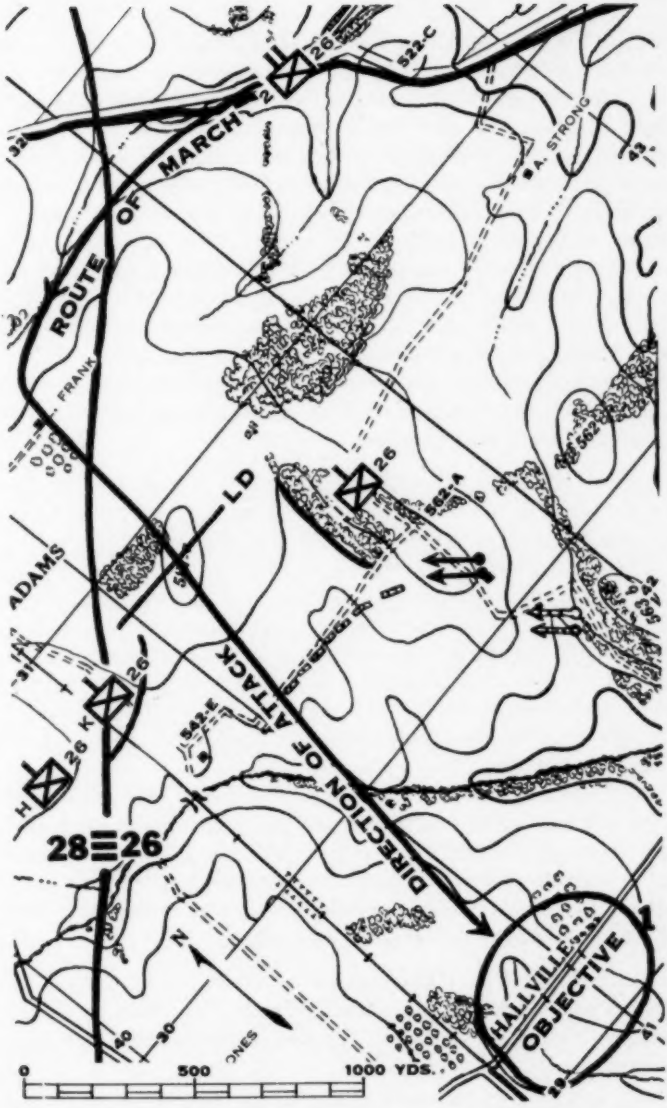


FIGURE 49.—Map E.

support to the 3d Battalion when that battalion continues the advance in its own zone. One platoon to continue its fire missions in the zone of the 1st Battalion; upon the capture of Hills *562* and *563-b* this platoon to provide close support to the 2d Battalion. The remaining platoon to continue in support of the 1st Battalion; when its fire is masked to displace to positions from which it can support the advance of the 2d Battalion.

(6) The artillery to be requested to place concentrations on known enemy positions along and south of the road: RJ 562-A—RJ 542-E and then to lift successively to Hill *563-b* and HALLVILLE. To request smoke on Hill *563-b*.

(7) Authority to be requested from the 28th Infantry for the 2d Battalion to move through its zone if desired by Lieutenant Colonel 2d Battalion.

17. SITUATION CONTINUED. — *a*. Colonel 26th Infantry issued the necessary orders to put the above plan in effect to Lieutenant Colonel 2d Battalion and others concerned, completing his orders at 0915.

b. Lieutenant Colonel 2d Battalion, after receipt of the order from Colonel 26th Infantry, immediately sent his Captain S-3 to the battalion command post to acquaint his officers with the situation, and to prepare the battalion for movement, while he briefly conferred with Commanding Officer 7th Field Artillery Battalion, Major S-3, and Captain Cannon Company.

c. Prior to this hour Lieutenant Colonel 2d Battalion had kept abreast of the situation by personal observation and the visits of staff officers, and he and his staff had formulated various tentative plans for employment of his battalion to meet possible eventualities. One of these plans fitted closely into the present situation.

18. SIXTH REQUIREMENT.—Orders, accompanied by an operation sketch, as actually issued at 0935 by Lieutenant Colonel 2d Battalion for the employment of his battalion.

19. A SOLUTION OF SIXTH REQUIREMENT.—Lieutenant Colonel 2d Battalion at his command post near RJ

505 (42-31), issued the following oral order, accompanied by an operation sketch in the form of an overlay (see Map E, figure 49), at 0935 to the officers assembled there:

"Make notes and follow me on your sketches.

"You are familiar with the situation.

"This battalion marches at once via the route shown on the sketch, and attacks at 1030 in the direction: Hill *587-a*—HALLVILLE.

"Formation for march: Company E, Company H, Company G, Company F.

"Line of departure and objective: see sketch.

"Company E, attacking on a front of not to exceed 400 yards, will pass between Companies I and K, capture the enemy position along the unimproved road running west from RJ 562-A, and continue its advance to capture the objective (HALLVILLE).

"Company G, battalion reserve, will await orders in woods south of L. Frank. (41-31.)

"Company F, battalion reserve, will await orders in the vicinity of ADAMS. (40-31.)

Company H, from positions shown on sketch, will employ all weapons to support the attack.

"I will accompany Company E as far as the line of departure.

"Any questions?

"It is now 0945. Move out."

CHAPTER 7

Military Leadership

The following manuscript is an adaptation of the introductory lecture given to Officer Candidates as part of their leadership training at The Infantry School. The illustrative anecdotes are personal experiences of the instructor, who saw action in some of the major engagements of the last war, and was several times decorated for outstanding leadership and courage.

Today leadership is more important than at any other period in our military history. It is more important because modern tactics place greater responsibility on small units and small-unit leaders. When battle is joined, success or failure depends upon the actions of the junior officer. If he knows his job and is ready and willing to accept responsibility without hesitation, if he uses initiative and acts with force and enthusiasm, he is a leader who will bring his unit through to victory. If he does not know his job, acts only upon instructions from higher authority, is hesitant, will not accept responsibility, and cannot control or conceal his emotions, he is a hindrance to the organization and will harm it in battle. Such an individual lays himself open to the most embarrassing situation which any officer may face—having his men stray off to follow another who does exhibit marked qualities of leadership.

Recent reports from theaters of operation inform us that many of our junior officers have not developed their leadership potentialities. The reports point out that many officers arrive on the field of battle with no mental preparedness. They lack initiative. They lack force. They are hesitant to accept responsibility. When unforeseen circumstances arise, they wait for instructions from higher authority

rather than make their own decisions and execute them promptly. These men are lost when they arrive on the battlefield. One of the combat team commanders said of the landing at Oran, "Some of my young officers seem to think that God is going to take them by the hand and lead them through their first engagement." It is good to have faith in God, but those officers failed to remember that God helps those who help themselves. They were not carrying out their part of the contract.

The mission of The Infantry School is to train combat officers. If you successfully complete this course, you will be commissioned as officers in the Army of the United States. In a short time, each of you will control the actions, the very lives, of a certain number of other men.

To these men, your soldiers, you will be the commanding officer, and looked up to as such. In drill, in training, and in maneuvers, they will follow you and obey you by virtue of your position and as a matter of discipline. But the success of a team in combat is not assured by the mere authority of the commander to issue orders; it can be assured only by the willing and effective execution of those orders by the men on the team.

In combat men demand more than an officer to whom they owe only routine obedience. They demand, and they have a right to expect, efficiency and leadership—a leadership that will produce willing, unhesitating obedience and loyalty, and a devotion that will cause them, when the time comes, to follow their leader through hell and back again.

We cannot teach you such leadership; but it can be learned. We can give you the elements, the base upon which it can be built, but the actual construction depends upon your own ability, character, and perseverance. It takes time, patience, and study, but it can be done.

Unless you can ask yourself this question "Will I be able effectively to lead my men in combat when the time comes?" and answer it in the affirmative, you are poorly prepared for the position to which you aspire.

Mental Preparation For the Shock of Battle

At best, entry into battle is accompanied by anxiety, fear, or extreme shock. If you have not prepared your mind for this shock, the ordeal will be much worse. The battlefields of today are from three to fifteen thousand miles away and it is difficult to make the junior officer realize, until too late, that he will be on one or more of those battlefields. The thoughts of participating in action are painful and disagreeable and the human mind tries to avoid them. The junior officer tends to do what Scarlett O'Hara did —put off the disagreeable things until tomorrow. This is a natural tendency. The same tendency was prevalent in 1917-1918. During the last war many officers were sent to the front before they had prepared their minds for battle. When they finally knew that they would be in action within two or three days, the shock was severe. It was too late then to learn the many things that should have been learned when they were in the rear areas and were receiving training. The same thing is happening in this war—officers are arriving on the battlefields mentally unprepared.

The officer, in order to prepare his mind for battle, must visualize and think ahead about actual battle conditions. You must, from this day forward, be thinking about what you would do under special battle situations so that when the situation actually confronts you, the problem already will have been thought out, a decision reached, and you can act immediately without having to go through the thought process. How you will do your job when the test comes, how you will destroy the enemy, how you will safeguard the lives of your men, is going to depend in a large measure on how well you can work out your problems before you arrive in battle. This is not theory. It is hard common sense.

Experience—Lt. Jones

Now, before I go any further, let me tell you of an experience that I had with a 2nd lieutenant who was assigned to my company just before the Battle of the Argonne in

the last war. It is unnecessary to give his correct name. Let us call him Lt. Jones.

Lt. Jones, after graduating from college where he had made an outstanding reputation as a football player, was selected to attend a training camp for officer candidates and later received his commission. He was then given a short period of service with troops, after which he was sent overseas as a replacement officer. When he arrived in France, he was sent to the 1st Division and then assigned to the company which I, as 2nd lieutenant, was commanding. This outfit within the four previous months had fought the Battle of Cantigny and fought through the campaigns of Soissons and St. Mihiel. During these engagements we had lost many men, and many raw recruits had been received to fill the ranks. The going was tough in those days and every spare minute that we could find was used to train the green men for battle. It was serious business, with no time for foolishness. The experienced soldiers who had gone through former campaigns knew that training meant success or failure, life or death. We all knew that the Battle of the Argonne was pending and that within a few days the company would be marching to the front. I was using my best efforts to train the new men for the battle that was before them.

Under these circumstances, Lt. Jones reported for duty and was assigned to command one of the platoons. The next morning the company was practicing battle formations, keeping of proper distances, taking cover, and adjusting gas masks. Lt. Jones went at the job in a somewhat apathetic, half-hearted manner. He had not yet realized that he and his men would soon be in actual battle and, as a result, his men were getting little benefit from the training. I called him aside and endeavored to jolt him into a realization of the seriousness of the work. In no uncertain terms I told him what I thought of his actions and his attitude. I was trying to be kind to him, but time was limited. It was my duty to tell him straight from the shoulder, and this I tried to do in the best manner possible. Lt. Jones resented it, but went back to his platoon and gave a fair performance

for the remainder of the exercise. After supper that night he looked me up. He was quite upset and about as angry as a man can be. He told me that no man could talk to him as I had and get away with it. He challenged me to take off my coat and "have it out." I told him that I was not interested in fighting him; that all I was interested in was the battle before me and advised him to put his mind on fighting the Germans until the battle was over, and then, if his feeling toward me had not changed, to come back and I would "take him on."

At dawn three or four days after this incident, our company was in a forward location ready to participate in the attack in the Battle of the Argonne. Our artillery was firing at full blast. About 10 minutes before H hour Lt. Jones came to me and apologized. He said that he wanted to let me know that he had no hard feelings whatever toward me and thanked me for talking to him as I had. He said that he realized that he had not known what it was all about. Before he left he told me that he had some money in an American bank in Paris, that no one knew about the money being there but himself, and that if anything should happen to him he wished that I would notify his wife about it. He rushed on back to lead his platoon into action. That was the last that I ever saw of Lt. Jones, he was killed within five minutes.

Lt. Jones was a fine, upstanding American boy but his training and Army experience had not developed him into a fighting leader. I cite this case as a horrible example of a young officer who did not think ahead and prepare himself for battle. He had wasted his precious training time. He had not thought ahead enough, even of his loved ones at home, to keep his personal affairs in order. Much less had he thought of the lives of the young men whom he was to lead in action.

Experience—
Three Germans Feigning Death

No soldier likes to talk of his experiences on the battlefield. For twenty-five years, I have been silent on the sub-

ject. But I had some experiences in the last war that might be of help in clarifying the ideas that I am trying to convey to you. If you forget personalities and excuse me for talking about myself, I will tell you of another personal experience.

During the last war, I was a 2nd lieutenant—and a very ordinary one at that. My services were with the 28th Infantry of the 1st Division. During the winter of 1917-1918 our Division was stationed in a training area in France. I had the good fortune to be quartered for that time with a very fine 2nd lieutenant by the name of George H——. George and I ate at the same officer's mess. In the evenings, we would drink our vin rouge together. We slept side by side in the same cow barn. We were closely associated and became very good friends. We continually talked about and discussed battle problems and arrived at definite conclusions. We lived war before going into battle.

Let me tell you of one simple problem which we considered. By our thinking ahead and planning, I know we saved many lives. This one instance concerned the problem of dealing with an apparently dead enemy. The Germans, like the Japanese in this war, had the trick of feigning death when attacked. After a wave of our troops passed over them they would spring up and shoot us in the back. If you are in the first wave of an attacking force following your artillery fire, you do not have time to stop, examine the enemy, and argue with him as to whether or not he is dead. You must keep going and stay close to your barrage. This problem had been considered and George and I had decided to take no chances.

In the battle of Cantigny this very problem confronted me. I was commanding a platoon in the first wave of the attack. As we approached their front line, several of the enemy came out of their holes and surrendered. These men were herded together and sent to the rear under guard. We started the advance again and were hurrying to make up the lost time and catch up with our barrage. When we arrived at the enemy front-line position, we saw that many of the enemy had been killed by our artillery and rifle fire. Dead Germans were lying everywhere in all kinds of posi-

tions. We looked at them hurriedly. There was no time for careful examination. We had to be on our way. However, right at the place where I was to cross the German trench, I noticed three Germans lying in such a position that they aroused my suspicions. They were lying on their stomachs with their heads pointing in the direction of enemy territory. Rifles and grenades were within easy reach of each of them. There was no time to argue with them. If they were dead

FIGURE 50.—During the battle of Cantigny I noticed three Germans lying in such a position that they aroused my suspicions. I shot one of the three. The others sprang for their rifles, but it was too late. I had the drop on them and killed them both.

I knew an extra bullet would not hurt. I shot one of the three. His death yell disclosed to the other two that their ruse had failed. They sprang for their rifles, but it was too late. I had the drop on them and killed both before they

could get into action. We rushed on, caught up with our barrage and continued the advance. Those Germans did not shoot any of my men in the back.

Experience—
Surprised by a Machine Gun

May I add another example? One evening George proposed this imaginary problem: "What should be done if when attacking with your platoon you are surprised and caught in the open, in flat country, by fire from a machine gun one hundred to two hundred yards away?" We discussed this problem and arrived at the conclusion that it would be suicide to lie down and try to knock it out by fire. Also it would be suicide to attempt to withdraw. If we should go forward at the normal rate, many of our men would be killed. We decided the thing to do would be to rush the gun, and that it was the duty of the leader to start the rush and get the gun out of action as quickly as possible. We knew the platoon would take up the rush when they saw their leader going for the gun. Of course, we expected men to get killed, but if the gun could be put out of action in ten seconds instead of twenty, only half as many lives would be lost. This course of action was agreed upon by both of us.

In the Battle of Cantigny I saw George get caught in the open by machine-gun fire. There was no stopping to think. He rushed; and his whole platoon followed. The gun was put out of action quickly. George was killed, but his immediate, spontaneous action saved the lives of many of his men. George was awarded the Croix de Guerre, posthumously. He did a great job, and I learned from his experience.

In my earlier days I had done some hunting and I knew that a dodging rabbit and a darting dove are hard to hit. I also knew that a charging, bellowing bull is disconcerting. I decided to put these principles into action if ever it became necessary for me to charge a machine gun. I went through almost the entire war before getting caught in the open by machine-gun fire, but it came to me. It happened in the

Battle of the Argonne near the little town of Exermont. My men were falling on both sides of me. I charged the gun, yelling at the top of my voice, side stepping, falling, getting up and running at a different angle. One of the most vivid and most horrible pictures of my life is the face of that machine gunner as he was trying to catch me in his line of fire. He would jerk his gun to one side and miss, and then to the other side and miss. Finally, as he lost his nerve, he jumped up and turned to run. I shot him as I jumped over his gun. The citation states that the rush was for 150 yards. I cannot vouch for the correctness of this distance. I did not stop to measure it, but I can vouch for the fact that the gunner was killed and I have a great satisfaction in feeling that some lives were saved. After the rush was started, I feel sure that the gunner did not kill another one of my men. He didn't have time. The platoon took up the rush, and had I been put out of action, that gunner could not have stopped their charge.

I have told you these two instances of a situation which was previously thought through by George and myself. We thought through many others. We thought of many which never happened. However, by merely thinking of them, we became more and more familiar with the problems of the battlefield. We simply lived war before we went into action and it certainly paid dividends.

LEADERSHIP

I have tried to indicate the absolute necessity for leadership in battle, but so far, I have failed to define it. What, then, is leadership? Of what does it consist? How may one develop it?

One might define it as the art of imposing one's will upon others; or it might be defined as the faculty of directing, controlling, and influencing others in a definite line of action. For simplicity's sake, let us say that it is the ability to handle men.

Leadership is a composite of a number of qualities. Among the more important are knowledge, judgment, tact, en-

durance, initiative, bearing, courage, dependability, justice, and enthusiasm.

Let us discuss these in some detail.

KNOWLEDGE

Knowledge is the most important quality that any leader, military or otherwise, can possess. You may have been associated at some time in your life with a man who had a very unattractive personality; who, at times, may have been tactless, even unjust; but in whom you nevertheless had confidence simply and solely because you realized that *he knew his job*. The well-rounded leader must possess the nine other qualities that have been mentioned, but knowledge is the starting point. Nothing will attract confidence and respect more quickly than demonstrated knowledge and ability. We are not referring solely to professional knowledge. Of course, we know that a military leader must possess more military knowledge than those he commands, but in addition he should have as much or more general knowledge, and certainly be just as well informed as his men on national and international events.

Bluffing has no place in the life of a military leader. You cannot bluff American soldiers. To attempt to bluff your men will certainly cost you their respect. If you don't know the answer to a question, frankly admit your ignorance. Then look it up, so that if the point comes up again you can answer it.

Knowledge not only gains the respect and confidence of your men and your fellow officers, but even more important, it gives you confidence in yourself. You should be so well informed on professional subjects that you will be able to act automatically in almost any military situation with which you might be faced—in garrison or in the field.

A leader must not only train his troops well; he must also train himself. He must teach himself to apply his knowledge. Knowledge should not be used as a substitute for thinking. It should be but a springboard for thought.

How can the junior officer gain knowledge quickly in the limited time available? No one expects him to be a walking

encyclopedia, of course, but how can he gain the knowledge necessary to do his job properly?

Every officer should maintain a military file or a small library. This library should contain pertinent field manuals and other training literature. Every officer should read the service journal and other professional publications pertaining to his branch. He should also familiarize himself with what is going on in the world by reading the newspapers regularly. He should read a weekly magazine that attempts to report and evaluate current news events, impartially and correctly. Serious conversation with other officers can never be considered as time wasted. Make a point of discussing battle situations with persons who have returned from the front. Remember that it is dangerous and expensive to rely upon what you expect to learn through your own experience in combat—your first experience may be your last.

In short, be alert, study, observe, listen, and look things up.

JUDGMENT

Knowledge alone is an ineffective instrument. To be a really constructive force, it must be tempered by other qualities essential to leadership. Of these, judgment is perhaps the most necessary complement. Judgment is the ability to make a wise choice of a policy or action. A man has good judgment in proportion to his ability to make correct decisions. For a person to make correct decisions he not only must have complete knowledge of the question involved, but also a calm and fair mental attitude. We usually say that a man who has a reputation for exercising good judgment has common sense. A man of common sense will usually weigh both sides of a question calmly and quickly, and arrive at a sound decision. He is the type who is looked to for advice.

We all know people whom we regard as "flighty" or "scatterbrained." They are the ones to whom we would not look for advice or guidance. They are the ones who talk before they think, pass judgment before they have studied both

sides of a case, who have no sense of proportion, and who go off "half-cocked." Obviously, such persons are not good leaders.

From the moment you join your units you will be called upon to exercise judgment in administrative matters and *training leadership*. When you arrive in the field, you will be called upon to exercise judgment in *combat leadership*. You will not always have time to deliberate upon a question or problem. Many times you will be called upon to exercise judgment on the spur of the moment. I want to tell you of one occasion when I had to think fast, and pass judgment on a situation in a hurry.

Just before the Battle of Soissons I lined up my platoon to talk to the men before going into action. Shortly before this time we had been through heavy fighting and had lost quite a few men. Replacements had been received to fill the ranks. After their arrival we had had a few field exercises which had shown me that, unfortunately, the new men were poorly trained, and had little conception of battle conditions. In maneuver they would bunch up, form groups, would not keep proper distance. They didn't "hit the ground" and were slow in taking cover. In general they were poorly disciplined and poorly trained. It was now too late to train them since we were going into the attack the next morning at dawn. In my talk I tried to impress them with the seriousness of what they were facing and what would happen to them if they did not follow the rules of self-protection. I laid it on pretty heavily since I expected the engagement to be serious, and I wanted to do my utmost to protect the life of each man in my platoon. When I was in the middle of my talk, and still had a lot of information that I felt it necessary to give them, one of the men in the front rank turned white as a sheet, wavered a second, and then pitched forward in a dead faint.

I quietly told a sergeant and corporal to pick the man up, take him behind the platoon, and revive him. The instructions were executed in a matter-of-fact way, and without confusion. As soon as the man was removed, the talk was continued in the same serious vein. I sensed from the facial

expressions of the men and their demeanor that my talk had had the desired effect—that the importance of proper conduct in battle had been sufficiently impressed upon them. However, I still had some information to give them. Through the S-2, I had learned that the enemy had placed a 77-mm gun a few hundred yards directly in front of our jumping-off position and in line of our advance. It was in such a position that our platoon could be subjected to direct fire soon after the attack began. It was important to tell the men this so that they would not be taken by surprise, should they come under direct fire from the piece. It was also necessary to make plans for capturing it. The subject was approached somewhat in the following manner: I asked "Who in this platoon knows how to fire a field piece?" Several men held up their hands. I then said "Good! The Boches have been shelling us for several days, and we are tired of it. I want to give them some of their own medicine. S-2 has a map which shows a 77-mm gun in place directly in front of where we jump off. When we capture that gun, I want you to swing it around, point it toward Germany, load it and let me know. I want the satisfaction of shelling them with their own shells."

Of course, I did not expect to hit anyone or do any damage, unless there should happen to be a lucky shot. The object of this bit of play was to prepare the men's minds for a difficult situation which they would face. I then presented the plan for capturing the gun.

Now, how can judgment be developed? The best way is to practice exercising it. When a situation arises for some other officer—your company commander or battalion commander—to make a decision, use that opportunity to come to a conclusion of your own. If your decision or plan is not in agreement with what was done, reason it through and find out why.

Broaden your own point of view by studying those of the other men. Form the habit of considering several angles to the little social arguments that occur every day.

When you are considering an important problem, argue it out with a friend, and take the opposite view from that

which you considered on first thought to be correct. Develop mental calmness and self assurance by increasing your store of knowledge. Learn from the mistakes of others.

TACT

Judgment is closely akin to another essential quality—tact. Tact is the ability to say and do the proper thing at the proper time in such a way that a responsive chord is touched. It is an understanding of human nature and a consideration for the feelings of others. You may know people who seem to have a superiority complex, others who seem to have an inferiority complex, and then there are others whom you consider just plain "funny" or "peculiar." Every individual has peculiarities, and in order to secure from him his best cooperation, he must be dealt with according to his nature.

It is nothing but common sense for a junior officer to be tactful toward superior officers and especially so toward his commanding officer. He should always carefully observe the rules of military courtesy down to the minutest detail. If his commanding officer has special likes or dislikes concerning certain rules of discipline or camp regulations, the junior officer should use his best efforts to see that such rules are observed. But in this connection we must realize that tact is certainly not to be confused with flattery, or with "boot-licking" or "apple-polishing."

On the other hand, a wise junior officer will be just as tactful toward his subordinates as toward his superiors. The tactful platoon leader will constantly be alert never to belittle or embarrass the men of his command. You must always be sincere in your dealings. The sincere and understanding person is usually a tactful person. You may make mistakes, but if your efforts are sincere you will inevitably find understanding and a willingness to cooperate.

Finally, remember always, a word of praise or of appreciation will normally accomplish more than all the condemnation or abuse that could be used.

One of the best things to remember in trying to develop

tact is to bear in mind that the "Golden Rule" has proved to be the most successful basis for satisfactory human relations.

Study the actions and conduct of other officers as concrete lessons in human behavior. Study the characteristics of other people so that you may deal with them without offending them.

ENDURANCE

So far we have mentioned only mental qualities. There are others that are physical in nature, or a combination of physical and mental. One of these, endurance, is physical and mental stamina. A man has endurance in proportion to his ability to stand pain, fatigue, distress, and hardship without breaking or giving in. It is one of the most important qualities in determining leadership ability. An officer must have this in order to command the proper respect from his subordinates. A lack of endurance may be confused with a lack of courage, and an officer who is in poor physical condition may be mistakenly branded as a coward, as a man lacking guts. He is no longer a leader. His services are worthless.

Endurance implies the ability to stick to a job and see it through. Physical endurance is much easier to achieve than mental endurance. Mental endurance is not only more difficult to achieve, but is similarly more difficult to understand in its fullest sense. An example of what we mean by mental endurance can be drawn directly from your present status as an officer candidate. The manner in which you retain the numerous implications of your training here at The Infantry School is a test of your mental endurance. To receive the instruction is only the beginning. The true value of your work here can be measured only in terms of the amount of training you retain and apply after you leave the school. Physical and mental endurance will be essential if you are to apply these principles of leadership so thoroughly that, when you are in the field, their application will come to you as second nature. Only when that

goal is accomplished will you have proved that you stuck to your present job and saw it through to its completion.

To develop physical endurance, you must cultivate physical training hobbies that will harden and build up your body; to develop mental endurance, form the habit of thinking and solving battle problems which are likely to be encountered; and to develop both physical and mental endurance, form the habit of finishing every job instead of making excuses for skimped work.

INITIATIVE

Initiative is the ability and willingness to originate and carry through a thought or act. The officer who will accept responsibility, who has the faculty of seeing what needs to be done, who will make a wise decision and take action without hesitation, is a vaulable man to his organization. The officer who does not have initiative, who will not accept responsibility, who has to be told what to do and how to do it by his superior, who looks upon the training of his men as a lifeless, impersonal duty, who will not or cannot visualize combat situations and prepare himself for battle, is a hindrance in the development of his organization as a fighting unit. Initiative on the part of the junior officer is essential in the execution of a training program, in administrative duties, and above all, in actual battle.

An example of lack of initiative during the training period on the part of a lieutenant was recently called to my attention. This lieutenant had been sent out with his platoon to an antitank range to train his men in the firing of the 37-mm gun at a moving target. The first shot broke the cable that controlled the movement of the towed target. The lieutenant sent out a truck to scour the area in search of a new cable. While this was being done, the men lolled about doing nothing. Three hours after the incident, the General who commanded the organization appeared on the range, making a routine tour of inspection. He was given a report of the situation and told that there was no new cable to be had.

The General had the platoon assembled and asked if anyone knew how to splice a cable. A soldier was found who had had experience in splicing cables when he had worked as a driller in the oil fields. This experienced man was given a helper, and within an hour the cable was mended and the target was back in operation. Unfortunately, by

FIGURE 51.—As the machine gunner lost his nerve, he jumped up and turned to run.

that time the period had ended and the platoon had to move off the range. Since no other period was available on the training schedule, the lack of initiative on the part of that lieutenant had deprived his platoon of their training in firing the 37-mm gun.

In battle, unforeseen situations, not covered by orders, arise constantly. A good leader will recognize these situations, accept the responsibility, and determine a course of action which will contribute most, in his estimation, to the accomplishment of his mission. *Any reasonable order in an emergency is better than no order.* It is better to do something, even if it is wrong, than to hesitate, hunt around for the right thing, and end up by doing nothing at all. Many battles have been won in spite of the poor tactics employed, but none have been won by doing nothing.

Bearing

Since you have been in the Army, you have probably heard a lot about bearing. Bearing is simply appearance and conduct. The military uniform makes a man conspicuous in the eyes of civilians. An officer's uniform, and his position of authority, make him conspicuous not only in the eyes of civilians but also in the eyes of his men. He, therefore, must be doubly careful about his dress, his carriage, and his behaviour. He is looked upon by his men as an example of what is right and correct.

An officer is expected and required to present a smart appearance, and to maintain his clothing and equipment in a clean, neat, and serviceable condition. He must conform strictly to regulations, so that he may establish the standard for the enlisted men of his organization. His carriage should be upright, and he should show life and energy in his actions and movements.

An officer should, at all times, be dignified in his conduct. Dignity is nothing more than the avoidance of coarse behaviour. It requires the control of one's emotions. To be profane, boisterous, or "loud-mouthed" is to be coarse. An officer who makes a spectacle of himself by being loud, or by losing his temper on slight provocation, quickly loses the respect of his men.

In developing bearing, it will be helpful to observe and study officers who enjoy reputations of having good bearing; to know and adhere to every regulation concerning

dress and behaviour; and to practice controlling your emotions.

COURAGE

Courage is another element without which leadership can neither be developed nor maintained. No man can be a leader who is not courageous. He must set an example for his troops.

To understand courage we must understand fear. Fear is an instinct, an animal emotion. It is an emotion excited by threatened evil or pain, accompanied by a desire to avoid that which threatens. We all feel fear in varying degrees. The totally fearless person does not exist. There are different kinds of fear. Sometimes a young and inexperienced officer is afraid to accept responsibility. He is afraid of making mistakes and being subjected to ridicule or censure. A man on the battlefield is afraid he will stop a bullet. Also, an officer may be afraid that he will show fear in front of his men and thereby lose their confidence and respect. If you hear a man say that he was not afraid on the battlefield, you may draw one of two conclusions: he is a liar, or he has never been in battle. Fear is a natural emotion which directs us to avoid injury or pain.

Courage is not the absence of fear. Courage is a mental quality which recognizes fear, but enables the individual to meet danger or opposition with calmness and firmness. It is a quality of mind that gives us control over our physical selves, causes us to accept responsibility, and to act in a dangerous situation. Courage is self-control which comes from a process of reasoning.

There are two types of courage. There is *moral courage*, and there is *physical courage*.

Moral courage goes hand in hand with truthfulness and righteousness. It includes recognizing, and standing up for, what is right in the face of adversity and popular condemnation. It is also that quality that brings a man to admit that he is wrong. Only a fool believes, or even tries to give the impression, that he makes no mistakes. A junior

officer who has moral courage will accept responsibility in administrative and training problems; he will admit his errors; he will stand for what is right; and he will enforce his decisions.

I recently heard a commanding officer, whose unit is still training in this country, say that six of his lieutenants, who were O. C. graduates, would not accept responsibility. He also stated that they were headed for the Reclassification Board. Not only will the Army lose the services of these officers at a time when they are needed, but also our country will lose the effort, time, and money that has been spent on their training.

When asked in a recent conversation what were some of the faults that he had observed in junior officers, a General who had just returned from the African front unhesitatingly replied: "Too many show a complete failure to accept responsibility."

I mention these two instances to force you to think about the subject. This quality of moral courage is vitally important and must be considered and developed.

Now let us consider the quality of *physical courage*. What is physical courage? In the strictly military sense, physical courage is just plain guts. It is self-control. It is the control of your mind over your physical self. The courageous man is one who, when faced with great physical danger, can make his mental self say to his physical self: "You may be afraid now, but if you knew where I am going to take you, you would be a great deal 'scareder' than you are." It is that faculty of self-control that will make a man go after an objective or hold onto a position even though he knows that it may cost his life.

The first thing that a man should do to develop courage is to study and try to understand his emotion of fear. He should then endeavor to develop mental control over that emotion. No two individuals have exactly the same reactions toward fear, and therefore this resolves itself into a personal and individual problem.

However, there are one or two general rules that might

be of value. If you are afraid to accept responsibility, begin today—right now—to accept minor responsibilities. Each success, no matter how small, will give you added strength and determination. From day to day, volunteer for and accept more important responsibilities.

If you are afraid of taking the jump on the obstacle course, go out every day and make the jump until you no longer have any fear of it. Make yourself do things of which you are afraid and do not give up practicing them until you have conquered that fear.

DEPENDABILITY

Dependability is one of the greatest assets that anyone can have. If you have been recognized as a dependable person, your superiors and subordinates will rely on you unhesitatingly. Dependability goes hand in hand with loyalty. A dependable man is one who is loyal to the team, loyal to the cause, loyal to what is right. He is a man who does not take advantage of a situation for personal pleasure, personal gain, or personal safety at the expense of the group.

Every man in the Army, regardless of his rank or location, is part of a team. In order for the team to reach its maximum effectiveness, each man must realize that many people are depending upon him to do his part.

For example, a General at a certain stage of the attack of an entire division may base his tactics on the behaviour of a single battalion, or even a single company, in some remote part of the line. In such a case the lives of thousands may depend on the actions of a few hundred. In order that the overall plan may be a success, those few men in that remote location, to the last individual, must be dependable.

A dependable officer is one who considers official orders as sacred. He enforces them to the letter in spirit and fact. Whether he agrees or not, he will not criticize his superiors or their orders in the hearing of others. When an officer is convinced of an error, he should present his views in a dignified, respectful manner to his next superior.

Dependability involves not only the ability to cause one's superiors to feel confident in their reliance upon him; of equal importance is the security felt by one's subordinates in knowing that their leader can be depended upon to do all that is possible for them. A dependable officer is constantly concerned about the care and welfare of his men. He will always do everything possible to improve the lot of his command. Once his men know that he can be depended upon to support their interests, they will accept danger, discomfort and hardship, confident that such circumstances would not have been imposed upon them if they were avoidable.

The development of dependability is based upon conviction and practice. When given a job to do, form the habit of doing it *now*. Do not put it off until some future time. Form the habit of doing well any job assigned to you, regardless of obstacles or hardships. Never forget that your soldiers form your team with which you accomplish your big job, and constantly concern yourself with their welfare.

JUSTICE

Do not confuse justice with laxity, leniency, or kindliness, nor on the other hand, with harshness, bullying, or tyranny. Justice implies the rendering of reward and the meting out of punishment in accordance with the merits of the case involved. Justice involves firmness and consistency. The ability to diagnose a case and to take proper measures is the yardstick of a leader's justice.

Justice must be impersonal and impartial. There is no place for personal likes or dislikes in the administration of justice. Anger and other emotions must not enter into a situation. Prejudice of race or creed must be avoided.

Few things will disrupt the morale of an organization more quickly than manifest unfairness or partiality of an officer toward a certain man or group of men. Firmness without favorites or favoritism is an essential quality of a leader.

A company officer is called upon to render justice large-

ly in such matters as promotions and company punishment. His decisions are a test of his fairness to the members of his command. For example, if a man goes AWOL for a couple of days, you must not let your sense of justice be influenced by your preconceived opinion of the man. You should consider how you would act toward someone else who had done the same thing, but of whom you thought differently. You cannot, if you are honest with yourself, punish him any more or less than you would punish your best friend or worst enemy for the same offense under the same circumstances. It must always be borne in mind that it takes a long time to build up a reputation among your men for being fair to the best of your ability. One thoughtless error on your part, or one case of injustice, can destroy a good reputation that may have taken weeks, or even months to establish. Therefore, every decision that you render should be carefully weighed to see that justice has been rendered without prejudice.

In developing a sense of justice, a person should check his own private life to see if he holds any prejudices. If he does, he should determine what they are and why they exist. He should then begin a course of study and training to rid himself of them.

In rendering justice a person must understand human behaviour. He should make it a habit to study people, with the idea of learning why certain types behave the way they do under certain conditions, and why others act differently under the same conditions.

He should analyze cases that have been decided, either correctly or incorrectly, and determine what he himself would have done had he been the one who had to make the decision. This, of course, is a private process and should never be used as an occasion to criticize the decision of another officer.

I want to tell you of a company commander under whom I once served. He was the most rigid disciplinarian I have ever known. Any enlisted man or officer under his command who violated a rule of discipline was called immedi-

ately to account. However, in all of his harshness, no one could ever say that this commander ever showed prejudice or partiality. When the time came for him to lead his men in battle, he gave a very good account of himself on the field and his company did a good job. He was killed by shrapnel fire in the first campaign in which he participated. I know of no officer whose death caused his men any more genuine grief than did the loss of this company commander. His men knew him to be a hard taskmaster but they recognized that he was fair in all of his dealings with them. His outstanding quality was firmness tempered with fairness. His men loved him because he was just.

ENTHUSIASM

No analysis of leadership would be complete without a consideration of enthusiasm. Enthusiasm deals with the great human faculty of feeling. We are enthusiastic toward an organization or a cause when we have an intense desire for its success, and when anything that hurts it or threatens it with failure causes us sorrow and distress. An officer cannot be a leader unless he possesses enthusiasm. Not only must he possess it himself but he must instill it in the hearts of his men. It is the heartpulse of his organization. It is the quality around which high morale and esprit-de-corps are built. It is the basis of the team spirit. Without it there is no team spirit.

It takes enthusiasm to win football games, and it takes enthusiasm to win battles. Without enthusiasm your organization is made up of a colorless, ineffective group of men who are doomed to defeat and failure. With proper enthusiasm, morale, esprit-de-corps, or whatever you want to call it, you can overcome great odds. The team or the company that believes in itself, that believes in its cause, cannot be whipped. The score may be against them, or they may be overrun by superior numbers, but the enemy will always pay through the nose. The team or the company that won't be beaten can't be beaten.

Since enthusiasm is a condition of feeling, the first thing

to do in developing it is for you to understand and believe in the cause for which you fight. Understand and believe in American principles, and think what it would mean to you should these principles be lost. Visualize what will be your lot and that of your loved ones should we lose this war. Everything that is sacred and dear in the lives of each of us is at stake. This is as true as the fact that I am standing here. If we lose this war, the American principles of life, liberty, and the pursuit of happiness will be lost forever. These are the things for which we fight. Understand it. Know it. Teach it to your men. Know, and let your men know, the cause for which we fight, and you will develop the necessary enthusiasm to build a fighting outfit.

CHAPTER 8

The Cannon Company In Defense

1. PURPOSE.—The purpose of this map problem is to provide instruction in the tactical employment and troop leading of the cannon company and its elements in situations involving (1) a reinforced infantry regiment in delaying action and daylight withdrawal from action, operating as a general covering force for a division; (2) the hasty organization and occupation of a regimental sector of a battle position; (3) the support of a combat outpost by a cannon platoon; (4) the close support of a front-line infantry battalion, including plans for counterattack; and (5) the plans for counterattack by the reserve battalion of the regiment.

2. GENERAL SITUATION.—Maps: Situation Map A, Operation Map A, Operation Map B. (See figures 52, 53 and 54, respectively.)

3. SPECIAL SITUATION.—*a.* During the night 1-2 September, the Blue 1st Division marched southwest in parallel columns on HUBTOWN from a bivouac area 20 miles to the northeast with the mission of opposing a probable Red invasion in that vicinity pending the arrival of the remainder of the Blue I Corps. Combat Team 3 preceded the division and was covered by an advance guard consisting of the 1st Battalion, 3d Infantry with the 1st Platoon, Cannon Company and Battery A, 5th Field Artillery Battalion attached.

b. Leading elements of Combat Team 3 reached L. Ray (15-15) at daylight (0650) September 2d. At this time Captain 1st Reconnaissance Troop 1st Division reported to Colonel 3d Infantry in substance as follows:

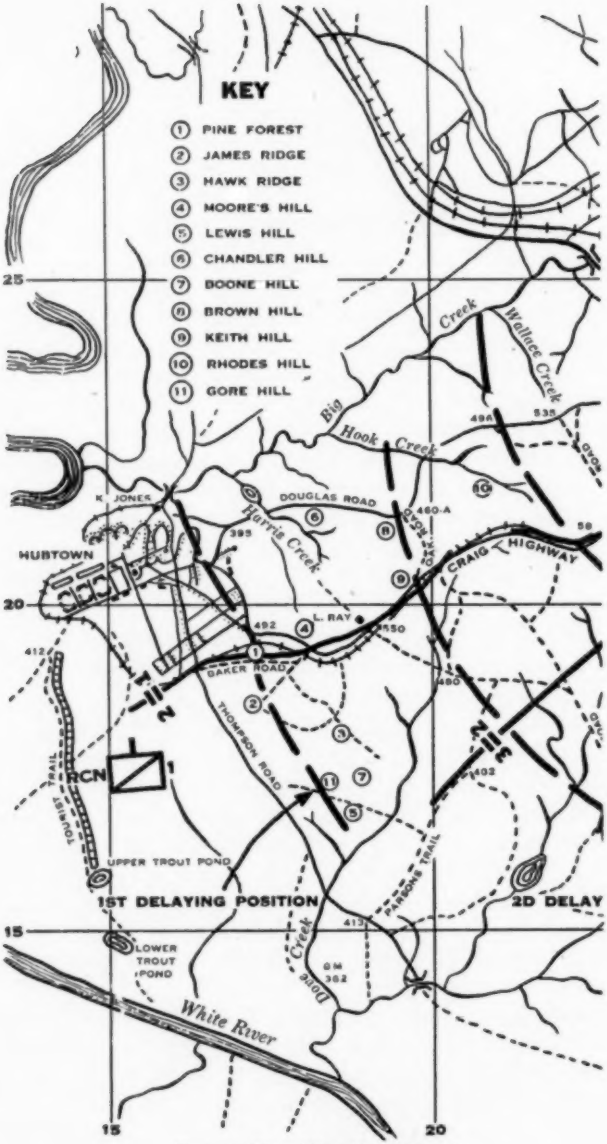
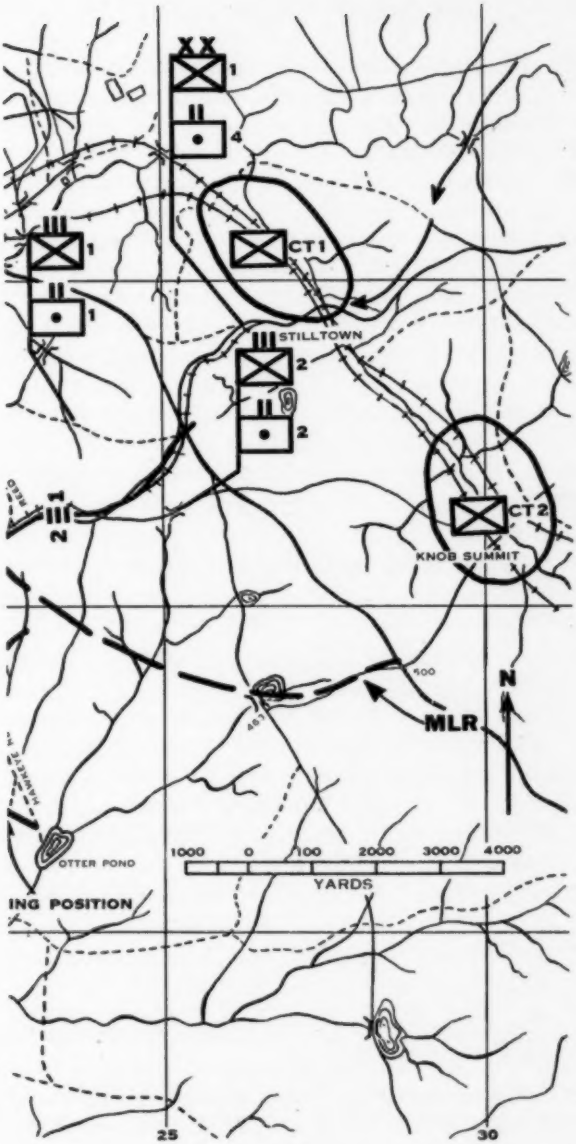


FIGURE 52.—Situation Map A.


XX
1
4
CT1
1
1
STILLTOWN
2
2
CT2
KNOB SUMMIT
N
MLR
1000 0 100 2000 3000 4000
YARDS
OTTER POND
ING POSITION
25
30

"My troop contacted the enemy about one-half mile west of Tourist Trail (10-15) at 0430 and has been engaged since that time. The major in command of the small garrison in HUBTOWN reported that the enemy forced a crossing of White River to the west beginning at dark last night. The enemy is now crossing White River on a broad front, using assault boats, foot bridges, and ferrying operations. Our combat aviation is interfering materially with the maintenance of ponton bridges. It is estimated that at least one infantry regiment, a few armored reconnaissance vehicles, and several batteries of light and medium field artillery have reached the east side of the river. HUBTOWN is being evacuated. Both the railroad and highway bridges across Big Creek just north of HUBTOWN have been destroyed. Hostile leading elements have now reached the line of Tourist Trail from RJ 412 (10-15) to Upper Trout Pond."

c. At 0700, the following written message from the Commanding General 1st Division was delivered to Colonel 3d Infantry:

"The 1st Division will organize and defend a battle position along the general line: Junction of Big Creek and Wallace Creek (20-20)—RJ 496 (20-20)—roadbend 1,000 yards west of RJ 584 (20-20)—CR 500 (25-15). Combat Team 3 with the 1st Reconnaissance Troop attached, will hold the enemy west of the line: RJ 460-A (15-20)—Oak Road—Hawkeye Road (20-15) until 1300. When forced from that line, Combat Team 3 will withdraw via routes south of the Craig Highway to division reserve at KNOB SUMMIT (30-20)."

d. After a brief map study and conference with his staff, Colonel 3d Infantry decided:

(1) To delay in successive positions by occupying two positions simultaneously.

First delaying position: K. Jones (15-20)—RJ 492 (15-15) high ground northeast of Thompson Road to Dove Creek.

Second delaying position: Hook Creek—RJ 460-A (15-20)—RJ 480 (20-15)—Otter Pond (20-15).

(2) To delay on the first delaying position with the 1st and 2d Battalions abreast, 1st Battalion on the right (north) flank. Boundary between battalions: Baker Road (15-15)—Craig Highway (to 2d Battalion).

(3) To have the 3d Battalion organize the second delaying position, and occupy the left (south) portion thereof, paying particular attention to the left (south) flank.

(4) To have the 1st Reconnaissance Troop continue to harass and delay the enemy and protect the left (south) flank of each delaying position in turn.

4. FIRST REQUIREMENT.—Together with other members of the regimental staff, you (Captain Cannon Company) are with Colonel 3d Infantry at L. Ray and are familiar with the situation as stated in paragraph 3, above.

Colonel 3d Infantry to Captain Cannon Company: "Give me your recommendations for the employment of the Cannon Company."

NOTE: Daylight begins at 0650; darkness begins at 2025.

5. A SOLUTION OF FIRST REQUIREMENT.—*a.* Captain Cannon Company to Colonel 3d Infantry: "Sir, I recommend that the 1st Cannon Platoon remain attached to the 1st Battalion, the 2d Cannon Platoon be attached to the 2d Battalion, and that the 3d Cannon Platoon, from an initial position area in the vicinity of Moore's Hill (15-15) be assigned the mission of supporting the entire regimental zone of action."

b. Discussion.—In open country, the fire power and flexibility of the howitzers make their use in support of a delaying force extremely profitable, and one or more platoons may be attached to each infantry battalion in contact with the enemy. Because of their ability to deliver effective long-range fire, either direct or indirect, the howitzers can render the maximum assistance to the other infantry elements in maintaining continuous resistance, thereby forcing the enemy to deploy early and to advance slowly and cautiously thereafter. The delaying force, occupying crest posi-

tions and employing covering forces on intermediate delaying positions, should withdraw before the action reaches the close combat stage. In the usual situation, the delay secured in this manner is sufficient to accomplish the mission of the delaying force.

6. SITUATION, CONTINUED.—*a.* Among other recommendations, Colonel 3d Infantry approved the recommendations of Captain Cannon Company. Regimental staff and liaison officers were dispatched at once to deliver fragmentary orders to battalion and separate unit commanders.

b. By 0800, the 1st and 2d Battalions were disposed on the first delaying position which extended from the bridge at K. Jones (15-20)—through RJ 492 (15-15)—James Ridge—Gore Hill—Lewis Hill (15-15), with local security detachments to the front. The 1st Reconnaissance Troop has withdrawn to the left (south) flank. Lieutenant Colonel 1st Battalion attached heavy machine guns, antitank guns, and 81-mm mortars to the rifle companies and placed Companies A, B, and C abreast on the first delaying position. Lieutenant Colonel 2d Battalion attached all heavy machine guns to front-line rifle companies but retained his antitank guns and 81-mm mortars under battalion control. Companies E and F were disposed abreast on the first delaying position, with one rifle platoon of Company G on Lewis Hill. Company G (less one platoon) was held in battalion reserve.

c. By 0830, local security detachments had been fired upon and were withdrawing to the first delaying position. Some enemy machine guns were firing from upper-floor windows of buildings in HUBTOWN, and enemy artillery fire was registering on James Ridge. Blue machine guns, mortars, and supporting artillery were firing intermittently on observed enemy groups, varying in size between squads and platoons.

7. SECOND REQUIREMENT.—*a.* Discuss the dispositions, methods of control, and fire action of:

(1) 1st Platoon, Cannon Company, attached to the 1st Battalion.

(2) 2d Platoon, Cannon Company, attached to the 2d Battalion.

(3) 3d Platoon, Cannon Company, in support of the entire regimental zone of action.

b. What tasks, in addition to the reconnaissance of the first delaying position, should be accomplished by Captain Cannon Company and his command group?

8. A SOLUTION OF SECOND REQUIREMENT.—*a.* (1) One section of the 1st Platoon should be attached to each of the two interior rifle companies of the 1st Battalion. The howitzers, from defiladed positions, should render close support against appropriate targets. The definitely located enemy machine guns firing from the upper-floor windows of buildings in HUBTOWN are suitable targets and should be engaged.

(2) The 2d Platoon, operating from positions on the reverse slope of Hawk Ridge, should render close support to the 2d Battalion by delivering effective fire on observed enemy groups and other definitely located targets.

(3) The 3d Platoon, in support of the entire regimental zone of action, will engage appropriate targets from initial firing positions on the reverse slope of Moore's Hill. It will be prepared to move promptly, if necessary, to reinforce any part of the regimental zone of action.

b. Captain Cannon Company, assisted by members of his command group, should reconnoiter routes for the withdrawal, intermediate delaying positions, and position areas from which effective fire can be delivered in support of the second delaying position. This information should be transmitted promptly to the platoon leaders of the 1st and 2d Platoons through the respective battalion commanders to which attached, and to the platoon leader of the 3d Platoon; if necessary, individual members of the command group should be detailed to act as guides.

c. Discussion.—Desirable characteristics of a delaying position are effective observation, good fields of fire at medium and long ranges, and covered routes of withdrawal. The major part of the first delaying position assigned to

the 1st Battalion affords only one of these characteristics—a covered route of withdrawal. Because of the close terrain in the northern portion, and the built-up area in HUBTOWN, observation is restricted and fields of fire are very limited in the area assigned to the 1st Battalion. In attaching supporting weapons to the rifle companies and placing those companies abreast on the first delaying position, the battalion commander has, in effect, created three small task forces capable of semi-independent action. It is evident that the 1st Platoon could not operate as a unit and render immediate fire support to all elements of the 1st Battalion in close terrain on a frontage of approximately 3,000 yards. Therefore, the attachment of an infantry howitzer to each interior rifle company, though exceptional, is justified in this situation.

Most of the area occupied by the 2d Battalion has excellent observation and long-range fields of fire. The 2d Platoon is carrying out its normal function by firing in close support of the battalion to which it is attached.

The 3d Platoon, from its central position area, can accomplish its mission of supporting the regiment. However, there is no one point from which the front of the entire regimental zone of action can be observed. It will therefore be necessary that observation posts be reconnoitered from which, collectively, the entire front can be observed. Such observation posts should be selected early, in order that plans for their prompt occupation and use may be made.

The Cannon Company command group is provided organically to serve both the individual platoons and the company as a whole, and should continue to furnish all practicable assistance to any platoon removed from company control by attachment to other units, as well as to those retained under control of the company commander.

9. SITUATION, CONTINUED.—By 0915, the leading Red elements were stopped in front of the first delaying position, except that infiltration of small enemy groups forced Company B to make a partial withdrawal in the area southwest of RJ 395 (15-20). At 1030, Red launched a

strong infantry attack astride Douglas Road. Elements of the 1st Battalion in that area began a withdrawal to previously reconnoitered intermediate delaying positions on the high ground east of Harris Creek (Chandler Hill). At 1045, the 1st Reconnaissance Troop reported that a strong enemy force, led by a few light tanks, forced a crossing of Dove Creek near BM 362 (15-10) and reached CR 413 (15-15) at 1030. At 1100, the 2d Battalion reported that the rifle platoon of Company G located on Lewis Hill (15-15) was forced to withdraw 1,000 yards northeast to Boone Hill, the position occupied by Company G, battalion reserve, because of an enemy envelopment from the southwest. At this time, Colonel 3d Infantry ordered a withdrawal to the second delaying position. He directed that the 1st and 2d Battalions maintain contact and harass and delay the enemy from intermediate delaying positions. At 1115, the 3d Battalion reported the approach of enemy tanks along Parsons Trail near RJ 482 (20-15).

10. THIRD REQUIREMENT.—*a.* You are Captain Cannon Company. Do you recommend to the regimental commander any change in dispositions or missions of your platoons at this time?

b. Discuss, in general, the combat action of each platoon during the withdrawal to the second delaying position.

11. A SOLUTION OF THIRD REQUIREMENT.—*a.* Captain Cannon Company recommends to Colonel 3d Infantry that the 3d Platoon be attached to the 3d Battalion without delay.

b. The sections of the 1st Platoon now attached to rifle companies of the 1st Battalion will remain so attached during this phase of the withdrawal. They will revert to platoon control when the 1st Battalion has occupied its new position. The platoon leader will utilize the personnel of his command group to assist the sections in their withdrawal by reconnoitering routes, and intermediate position areas, and by the use of available transportation to facilitate the resupply of ammunition to the howitzers. The platoon ammunition truck with trailer will be placed in defi-

lade and concealed near Brown Hill, prepared to effect replenishment of ammunition to the sections from or at this location as the situation dictates. Each chief of section will be notified of its location.

The 2d Platoon is attached to the 2d Battalion and therefore the platoon leader will look to Lieutenant Colonel 2d Battalion for tactical orders. An early withdrawal is anticipated, so routes and position areas must be reconnoitered. Lieutenant 2d Platoon should request Captain Cannon Company to provide reconnaissance personnel from his command group to assist in making the necessary reconnaissance and in furnishing guides. The platoon ammunition truck with trailer will be concealed in a defiladed position near Keith Hill and each chief of section will be notified of its location. The platoon ammunition truck should be used to effect replenishment of ammunition to the sections; other available transportation may be used, depending upon the situation at the time.

The 3d Platoon, upon being attached to the 3d Battalion, should follow a previously reconnoitered route in moving at once to the area of the 3d Battalion. Lieutenant 3d Platoon with enlisted assistants should precede the platoon and report to Lieutenant Colonel 3d Battalion for orders. Thereafter, he should make the necessary reconnaissance and be prepared to commit his platoon to action without delay. The platoon ammunition truck with trailer should displace with the platoon.

c. Discussion.—The situation indicates that the 3d Battalion will soon be engaged in a fire fight with hostile elements, including tanks, since it occupies a critical area on the left (south) flank, it should be given any available howitzer support. While the primary mission of the Cannon Company is the destruction or neutralization of hostile infantry supporting weapons, it must always be prepared to supplement the antitank defense of the regiment. The 3d Platoon is therefore attached to the 3d Battalion.

In the withdrawal to successive positions, intermediate positions should be occupied which will enable the respective

platoons to continue to furnish immediate and powerful fire support to the infantry elements. Positions affording long-range fields of fire and covered routes of withdrawal are desirable.

Ammunition for the Cannon Company essential to initiate combat is carried for each howitzer on its section prime mover. Additional ammunition for each howitzer is carried on the ammunition vehicles of platoon headquarters. Unless the situation requires that the company commander assume control, as when one platoon suffers vehicle losses which necessitate employing the vehicles of another platoon for its supply, these vehicles remain under platoon control. They are held under cover in the platoon area as close to firing positions as the terrain permits except when engaged in the resupply of ammunition.

NOTE: This concludes that phase of the problem dealing with the action of Combat Team 3 as the general covering force of the 1st Division.

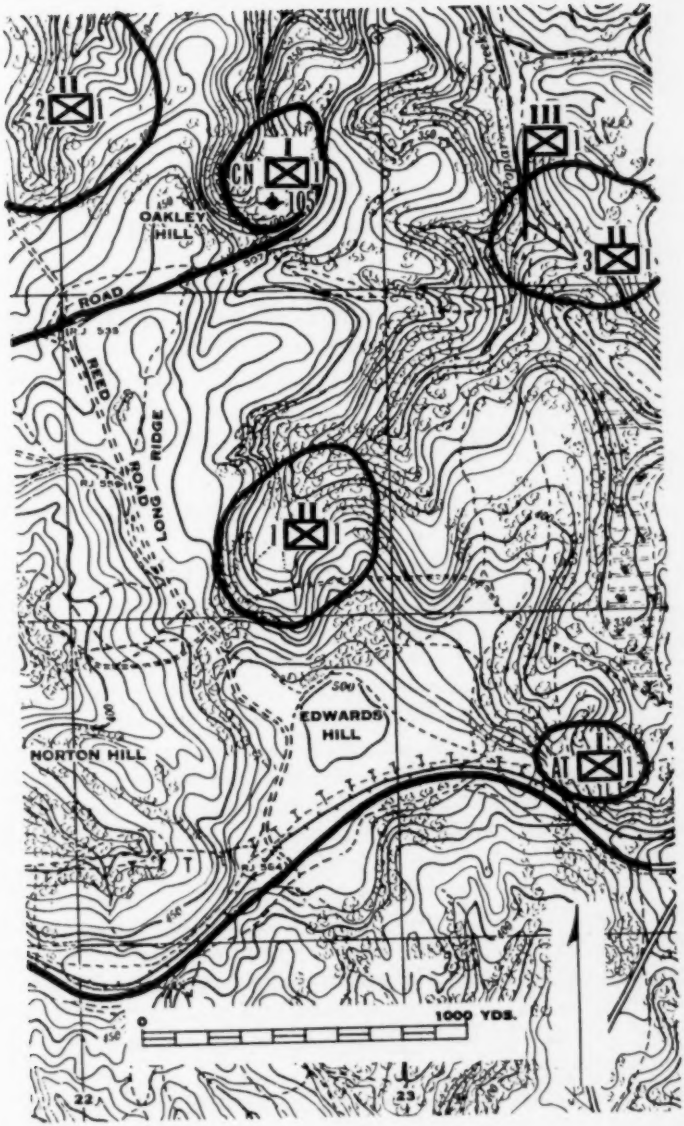
12. SITUATION, CONTINUED.—By 0500, 2 September, Combat Team 1 had occupied its bivouac area near STILLTOWN. (25-20.)

At 0700, a number of airplanes were heard approaching from the west and shortly thereafter the bivouac area was bombed, with resultant personnel casualties of 24 officers and men, and the destruction of 5 vehicles.

At 0715, Colonel 1st Infantry received the following message from Major General 1st Division: "Report without delay with Lieutenant Colonel 1st Field Artillery Battalion and necessary staff to RJ 584 (20-20) for orders."

Colonel 1st Infantry assembled appropriate members of his staff, made a brief map study, directed Lieutenant Colonel Executive Officer to alert the command, and, accompanied by * * * Captain Cannon Company * * * proceeded by motor to RJ 584, where a guide met Colonel 1st Infantry with a message directing him to report to the division commander with not more than two members of his staff. The remainder of the party, (including Captain Cannon Com-

FIGURE 53.—Operation Map A.


OAKLEY HILL
ROAD
REED
ROAD
RIDGE
LONG
EDWARDS HILL
HORTON HILL
1000 YDS.
22
23

ML 8

pany) with their transportation, was conducted to a covered position nearby.

Pertinent extracts of the division order received by Colonel 1st Infantry are:

* * * * * *

"We organize and occupy a battle position without delay. For location of MLR, boundary between regiments, and CP's, see Situation Map (figure 52).

* * * * * *

"Immediately upon arrival on position, strong combat outposts will be established by front-line infantry regiments.

* * * * * *

"1st Field Artillery Battalion in direct support of 1st Infantry.

"One and one-half units of fire will be placed on position."

* * * * * *

At 0745, Colonel 1st Infantry rejoined his party, made a brief map study and (1) announced a tentative decision to defend the regimental sector with the 1st and 2d Battalions on the main line of resistance, 2d Battalion on the right, and 3d Battalion in reserve; each front-line battalion to establish a combat outpost upon arrival on position; (2) marked a map to indicate assembly areas (see Operation Map A, figure 53) and directed one of the liaison officers to take this map to Lieutenant Colonel Regimental Executive Officer, acquaint him with the situation and give him the following message: "Move regiment, off roads, to the designated assembly areas. Have battalion commanders report to me at RJ 535, junction of Douglas and Reed Roads, at 0900." (3) directed that members of the unit and special staff report to him with their recommendations at RJ 535 at 0845.

13. FOURTH REQUIREMENT.—You are Captain Cannon Company.

a. Give your actions and orders prior to reporting to Colonel 1st Infantry at RJ 535 at 0845.

b. What recommendations will you submit to Colonel 1st Infantry for the employment of the Cannon Company?

c. What is the plan for the supply of ammunition to your company?

14. A SOLUTION OF FOURTH REQUIREMENT.—*a.* (1) Captain Cannon Company, in his capacity of Howitzer Officer, a member of the regimental staff, contacts 1st Lieutenant Liaison Officer and hands him the following written message, to be delivered to the Second-in-Command, Cannon Company: "Have Staff Sergeant Reconnaissance and Sergeant Communications report to me at RJ 507 without delay. Have platoon leaders meet me for orders at RJ 507 at 0925." (As stated in paragraph 12, above, Lieutenant Liaison Officer has been ordered by the regimental commander to transmit an operation map and message to Lieutenant Colonel Regimental Executive. By having Lieutenant Liaison Officer transmit this message, Captain Cannon Company saves his own messenger for future use.)

(2) Makes a motor reconnaissance via Reed Road—Craig Highway — Rhodes Hill — Jefferson Hill — Cornell Hill — Green Hill—Douglas Road—to RJ 507 where Staff Sergeant Reconnaissance and Sergeant Communications report to him as ordered.

(3) Directs Sergeant Communications to reconnoiter the assembly area assigned the Cannon Company and be prepared to guide the platoons to their respective portions of the assembly area.

(4) Conducts Staff Sergeant Reconnaissance to the high ground on Long Ridge where he orients him, pointing out the assembly area of the Cannon Company and a tentative position area for each of the cannon platoons from which they can accomplish the missions he plans to recommend. Captain Cannon Company then directs Staff Sergeant Reconnaissance to reconnoiter covered routes leading from the company assembly area to the position area of each platoon.

b. Reports to Colonel 1st Infantry at RJ 535 at 0845 and recommends:

(1) That 1st Platoon initially support the combat outpost of the 1st Battalion from a position area southeast of Norton Hill. That upon withdrawal of the combat outpost, the 1st Platoon displace to previously reconnoitered and prepared positions affording defilade and concealment east of Edwards Hill (22-21) from which it will provide close support to the 1st Battalion.

(2) That 2d Platoon be placed in close support of the 2d Battalion from defiladed positions in the area 450 yards northeast of BM 83 (21-22).

(3) That 3d Platoon, from a position area in the edge of the woods in the vicinity of (22.6-22.6), be given the mission of supporting the entire regimental sector.

(4) That cannon platoons in close support of battalions be prepared to support the reserves of those battalions in their respective counterattacks, and that all cannon platoons be prepared to support the regimental reserve in the regimental counterattack.

(5) That the Cannon Company command post be located in concealed defilade just east of Oakley Hill (22-23), and that the company ammunition point be established nearby.

c. When a platoon ammunition truck and trailer are emptied by dumping loads in the platoon position area, the platoon leader dispatches them to the company ammunition point for replenishment. The vehicle is then sent, under company control, to the regimental ammunition distributing point, where it may be refilled from mobile reserve or stock on hand established by the regimental munitions officer on recommendation of the commander of the Cannon Company. If sufficient reserve is not available at the regimental ammunition distributing point, the vehicle is sent, under regimental control, to the ammunition supply point established by higher authority, where it is refilled.

d. Discussion.—The tasks confronting Captain Cannon Company at this time are: (1) the formulation and submission of recommendations for the tactical employment of his company; (2) the disposition of the company in the designated assembly area, prepared for immediate combat

in accordance with the regimental plan; and (3) the selection of a position area for each platoon and a covered route leading thereto. Captain Cannon Company cannot personally perform all of these tasks in the limited time available and therefore should take immediate steps to have qualified assistants sent forward to help him.

No howitzers were attached to the combat outpost of the 1st Battalion because these weapons would be extremely vulnerable in such exposed positions.

No howitzers were attached to the combat outpost of the 2d Battalion because observation and fields of fire are available from positions in rear of the main line of resistance. The 2d Platoon should support the combat outpost of the 2d Battalion by long-range fire, observed from the vicinity of Green Hill.

In order to provide immediate and powerful fire support for companies defending the main line of resistance, one platoon should be placed in close support of each front-line battalion. The retention of one platoon in general support will provide flexibility in the fire plan of the Cannon Company.

15. SITUATION, CONTINUED.—*a.* Colonel 1st Infantry met the members of his staff at RJ 535 at 0845 and received their recommendations. The recommendations of Captain Cannon Company were approved. The Battalion Commanders reported at 0900. Colonel 1st Infantry, his assembled staff and his battalion commanders moved to a point on Long Ridge from which most of the regimental sector could be observed. After a brief orientation by Major S-3, Colonel 1st Infantry issued an oral order for defense of the regimental sector.

b. Captain Cannon Company then moved to RJ 507 and issued his company defense order to his assembled platoon leaders. Based upon the regimental order, extracts of Captain Cannon Company's order follow:

"1st Platoon will provide close support to the 1st Battalion from * * *

"Lieutenant 1st Platoon will report to Lieutenant Colonel 1st Battalion on Long Ridge without delay."

* * * * * *

c. Upon completion of the regimental order, Lieutenant Colonel 1st Battalion and members of his staff proceeded to Long Ridge where Lieutenant 1st Platoon Cannon Company reported to him as ordered. Following a brief map study, Lieutenant Colonel 1st Battalion (1) announced his tentative plan to defend the 1st Battalion area with Companies B and C on the main line of resistance, Company C on the left; Company A, battalion reserve, to organize defense areas generally along Reed Road, establish the combat outpost with two rifle platoons, and prepare plans for counterattack against possible enemy penetration west of Norton Hill; (2) directed * * * Captain S-1 to supervise the movement of units into the battalion assembly area and to have rifle company commanders report at RJ 559 for orders at 1000; (3) directed that staff reports be submitted at that time and place; (4) directed Captain S-3, Captain Heavy Weapons Company, Lieutenant Artillery Liaison Officer and Lieutenant 1st Platoon Cannon Company to accompany him on reconnaissance. Lieutenant Colonel 1st Battalion and party then left on reconnaissance, planning to coordinate while en route with Lieutenant Colonel 2d Battalion and the adjacent battalion commander of the 2d Infantry.

16. FIFTH REQUIREMENT.—You are Lieutenant 1st Platoon, Cannon Company. Upon completion of the reconnaissance, Lieutenant Colonel 1st Battalion asked the following questions:

a. Can your platoon support the combat outpost? If so, where will your howitzers and observers be located?

b. What can your platoon do to furnish fire support during the withdrawal of the combat outpost?

c. (1) In what general area will your howitzers be located when firing in support of the main line of resistance?

(2) What fire support can your howitzers provide for the defense of the main line of resistance?

17. A SOLUTION OF FIFTH REQUIREMENT.—Lieutenant 1st Platoon, Cannon Company, replied as follows:

a. Sir, my platoon can support the combat outpost by placing indirect fire on appropriate targets in the area to the front of the combat outpost line. My howitzers will be located in initial firing positions just southeast of Norton Hill and my observers will be located with the combat outpost.

b. During the withdrawal of the combat outpost, my platoon will be displacing to positions from which to support the defense of the 1st Battalion. Consequently, it will be unable to furnish fire support during the withdrawal of the combat outpost.

c. (1) When firing in support of the main line of resistance, my howitzers will be located in defiladed and concealed firing positions east of Edwards Hill.

(2) The howitzers can support the main line of resistance by placing observed fire on Parker Ridge or on any other part of the foreground of the battalion defense area. If necessary, they can furnish depth to the antitank defense of the battalion by moving to partially defiladed, supplementary firing positions from which they can engage any enemy tanks which penetrate the main line of resistance.

d. Discussion.—Although howitzers should not be attached to the combat outpost, it is desirable that these weapons furnish fire support to the outpost whenever possible. In this situation the mission of providing close support to the combat outpost can be fulfilled from initial positions (with one or more alternate positions for each piece) in rear of the main line of resistance if the fires are adjusted by observers located with the combat outpost. In order to shorten communications between howitzers and observers, initial positions for the support of the combat outpost are located as close to the main line of resistance as requirements of mask clearance will allow. The position area recommended for occupation by the 1st Platoon after withdrawal of the combat outpost is farther to the rear than is normal, but this location is imposed by the confor-

mation of the terrain in the defense area assigned to the 1st Battalion. The probability that the enemy will use the broken terrain in the valley of Hook Creek as an avenue of approach into the battalion defense area requires early displacement to the rear by the 1st Platoon. Edwards Hill affords the next defiladed position area to the rear, and the wide flat top of that hill imposes the long range. Normal targets are machine guns, enemy formations (not scattered individuals), armored vehicles, and antitank guns. The platoon must be prepared to defend itself against mechanized attack and to deliver concentrations on critical areas on call.

18. SITUATION, CONTINUED.—By 1100 all elements of the 1st Battalion, including the combat outpost, are in position. Combat Team 3 is still holding the line Brown Hill—Keith Hill (shown on Situation Map A, figure 52). Captain Company A 1st Infantry is preparing a plan of counterattack to be executed by the battalion reserve (Company A, after it withdraws from its combat outpost position) in case the enemy makes a minor penetration (Operation Map B, figure 54) and an alternate plan to occupy prepared platoon defense areas numbers 1, 2 and 3 to limit a major penetration (Operation Map B). The plan of Captain Company A envisions the coordinated support of all available machine-gun, mortar, cannon and artillery fire.

19. SIXTH REQUIREMENT.—You are Lieutenant 1st Platoon, Cannon Company.

a. What is your recommendation for howitzer support for the proposed counterattack of Company A?

b. What is your recommendation for howitzer support to be given Company A in limiting the major enemy penetration from prepared positions?

20. A SOLUTION OF SIXTH REQUIREMENT.—Lieutenant 1st Platoon, Cannon Company, recommends that his platoon support Company A as follows:

a. For the Counterattack: By fires on appropriate targets in the area of penetration from firing positions east of Edwards Hill, with observation posts on Long Ridge, fire to

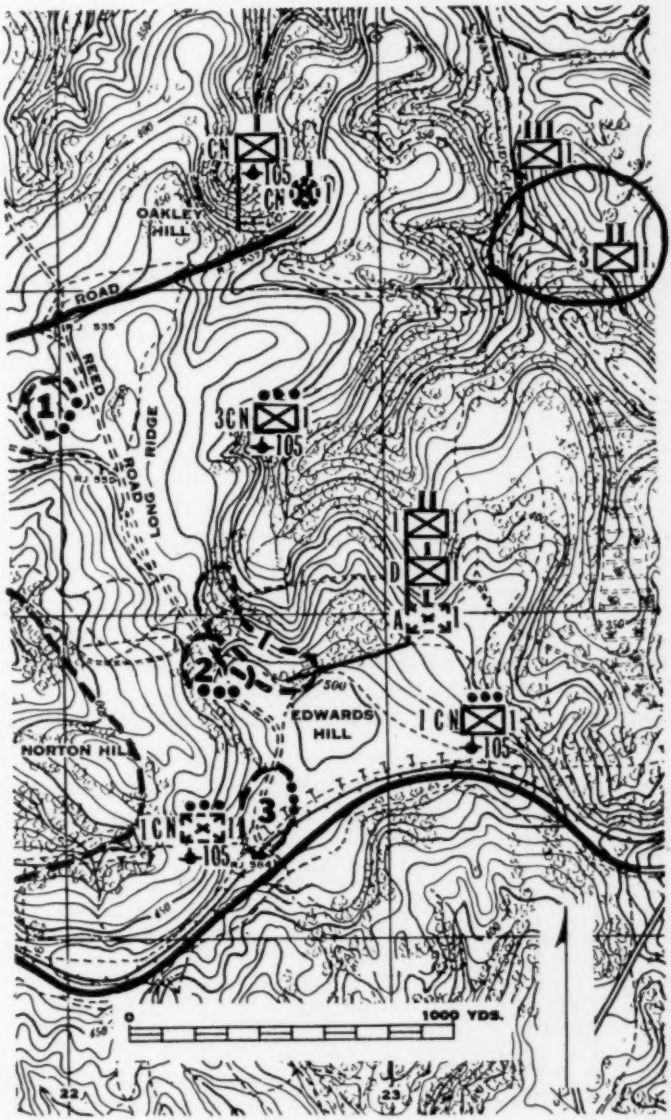
cease on a prearranged pyrotechnic signal to be fired by the leading elements of Company A.

b. For the limitation of a major penetration: By fires on all appropriate targets from firing positions east of Edwards Hill, with particular attention to enemy supporting weapons.

c. Discussion.—The howitzer support to be given the counterattack should be a heavy concentration of neutralizing fire on the area of enemy penetration, whereas the support of a unit occupying a prepared position to limit an enemy penetration should consist principally of the delivery of effective fire on appropriate, definitely located targets.

21. SITUATION, CONTINUED.—At 1330, Combat Team 3 was forced from the line Brown Hill—Keith Hill and withdrew according to plan south of Craig Highway. By 1600, the enemy forced a withdrawal of the combat outpost of the 1st Infantry, and shortly thereafter launched a coordinated attack against the regimental sector, with the main effort directed southeast up the valley of Hook Creek against Norton Hill. This attack was supported by artillery and a few airplanes. By 1800, the enemy had made a minor penetration of the main line of resistance along Hook Creek (Operation Map B). Company A was ordered to counterattack and Company L (in regimental reserve) was ordered to occupy defense areas numbered 1, 2, and 3. The counterattack by Company A was partially successful until blocked by enemy reinforcements. Hand-to-hand fighting and some loss of control resulted. At dark (2025) Colonel 1st Infantry directed Lieutenant Colonel 1st Battalion to withdraw all elements of his battalion from the area marked, "Major Penetration" on Operation Map B and to have Companies A and C, upon reorganization, revert to regimental reserve in the woods north of Edwards Hill. He also directed that a heavy concentration of fire be placed on the area of penetration at intervals throughout the night, and that the 3d Battalion (less Company L) counterattack at daylight (0650), 3 September.

FIGURE 54.—Operation Map B.


OAKLEY HILL
ROAD
REED
ROAD
LONG RIDGE
EDWARDS HILL
NORTON HILL
1000 YDS.
22
23

At 0100, 3 September, in compliance with a message delivered by a foot messenger, Captain Cannon Company reported to the regimental command post, where Lieutenant Colonel 3d Battalion outlined his plan of counterattack. Other officers present included Lieutenant Colonel 1st Field Artillery Battalion, Major S-3, 2d Infantry, Captain Antitank Company, and representatives from the 1st and 2d Battalions. This counterattack plan called for a movement under cover of darkness to a line of departure along the trail immediately west of RJ 559 and an attack at daylight in the direction: trail junction at (21.9-22.5)—Parker Ridge to reestablish the main line of resistance (Operation Map B). The plan contemplated the use of all available supporting fires and detailed coordination with the 2d Infantry. Colonel 1st Infantry approved this plan and requested that the 1st Field Artillery Battalion fire a 15-minute preparation on the area of enemy penetration, to lift at H hour plus 5 minutes, and thereafter to blind enemy observation with smoke, and block enemy reinforcements by firing artillery normal barrages in front of the main line of resistance.

22. SEVENTH REQUIREMENT.—*a*. You are Captain Cannon Company. What is your plan of support for the counterattack of the 3d Battalion, including the position areas and specific fire missions to be assigned to each platoon?

b. What steps are necessary to insure an adequate supply of ammunition for the operations on 3 September?

23. A SOLUTION OF SEVENTH REQUIREMENT. —*a*. Captain Cannon Company recommends that all three platoons provide close support to the counterattack of the 3d Battalion from present positions as follows:

(1) 1st Platoon to fire concentrations on observed targets within the area Norton Hill—Craig Highway inclusive, and when fires are masked to continue to provide close support of the 3d Battalion.

(2) 2d Platoon to deliver observed fires on appropriate targets on Parker Ridge and the unnamed ridge 500 yards

east thereof until ordered to cease; thereafter to revert to its original mission of close support of the 2d Battalion.

(3) 3d Platoon to fire concentrations on that part of the valley of Hook Creek north of Norton Hill, and when fires are masked, to revert to its original mission in support of the entire regimental sector.

(4) All howitzers to be prepared to engage enemy armored vehicles whenever such vehicles come within effective range.

b. Present loads of platoon ammunition vehicles were dumped in the position area of each platoon. During the night 2-3 September, the emptied platoon ammunition vehicles were dispatched through the company ammunition point to the regimental ammunition distributing point with a request for replenishment. These vehicles were then conducted, under regimental control, to the ammunition supply point for refill. Upon return to the regimental ammunition distributing point, the vehicles were released to company control, and thence to platoon areas where they were unloaded. Empty vehicles were again sent to the rear for refill.

c. Discussion.—All of the cannon platoons should support a counterattack by the regimental reserve. In this situation, the excellent observation to be had from the vicinity of Reed Road will enable the howitzers of the 1st and 3d Platoons to keep their fires ahead of the infantry attack, thereby rendering the closest possible fire support and permitting them to lift or shift fires when about to be masked by the advancing infantry. The 2d Platoon, firing from defiladed positions with observers on Green Hill, should be able to destroy or neutralize promptly any enemy supporting weapons appearing in its assigned target areas.

The ammunition plan must provide an adequate supply of ammunition to the platoons. A record is maintained by each section, showing the level of ammunition supply and the amount of ammunition expended by each howitzer. This information is reported by each chief of section to the platoon leader. When the platoon leader sends the platoon

ammunition truck and trailer to the company ammunition point for refill, he also sends a report of the amount of ammunition on hand with his platoon. Thus, Captain Cannon Company who is responsible for the initial supply and resupply of ammunition to his platoons, is kept informed of the amount of ammunition on hand with each platoon.

CHAPTER 9

Training in Tank Recognition and Identification

The biggest asset of an armored vehicle is its mobility. And that means quite simply that it will usually appear where it is least expected. Successful countermeasures depend upon the constant readiness of all installations throughout the theater of operations to take instant action against threatened tank attack. Enemy tanks are capable of the widest flanking movements as well as deep penetrations. Darting far inside our lines, they may, unless stopped, impair vital supply and communication lines and disrupt or destroy such rear installations as supply dumps, repair depots and command posts. The front-line unit that is caught napping by such forays will fall an easy victim to the crushing weight and imposing fire power of these vehicles.

To meet this threat our armament is sufficient. Any artillery piece that comes to grips with a tank or other armored vehicle at close quarters can blast these mobile fortresses at point-blank range. Our antitank guns have gone through a process of continuous improvement in order to keep pace with the increasing strength of tank armor. A grenade launcher is found in every rifle squad and other new weapons are now provided for antitank defense within the regiment. Small arms can play their part, at the least forcing hostile vehicles to "button up," thus restricting their facility of maneuver. When other means are not available, the Molotov cocktail and the sticky grenade, improvised from materials at hand, will enable troops to win the decision if they are sufficiently resolute, determined, and resourceful.

No armament, however, can provide a substitute for proper training of the using troops. No gun can distinguish between enemy and friendly vehicles. The men who use the arms must have the training to enable them to make this distinction, or disaster will result. This is obviously true for antitank personnel. Though less obviously so, it is equally true for all personnel. Every unit must post air-antitank guards. Any soldier might be selected for this duty. He *must* be able to distinguish between enemy and friendly armored vehicles. The safety of the entire unit depends upon his ability to do so. Similarly, reconnaissance patrols may be selected from any group of riflemen, and enemy armored vehicles will be one of the most important items of their searching.

Service units also must be trained in this subject. One tragic error occurred when a guard who was stationed to direct traffic at a cross-road stopped all other traffic to permit the passing of a column of enemy tanks. The commander of the leading tank had given the proper recognition signal, and the guard, being ignorant of how to recognize the tanks, assumed them to be friendly. The fault lay not so much with the guard as with the training given him by his officers.

Armored vehicle recognition is not an easy matter. In combat, these vehicles will rarely approach head on or directly across the front. They will come in at all angles, dipping and dodging, looking very different from the precise and static silhouettes presented in training literature. Camouflage and indiscriminate deckloads of equipment and improvised extra armor will further obscure the characteristic silhouette. Models and types undergo such constant change that few rules of identification can be safely applied to all tanks of any one nation.

In training it is seldom possible to find actual vehicles with which soldiers can familiarize themselves at first hand. And over and above all other difficulties hangs the ever-present dilemma of all war training—too much to be done, and too little time to do it.

To overcome such complications the training must be

carried out under a logical plan that outlines all the work to be covered. This plan must be so clearly understood by the instructor that he can follow it even through day-to-day changes. For example, every chance opportunity—such as the presence of a tank within reach of the training unit—should be seized and exploited. Such occasions will sometimes tax the ingenuity of the instructor, but if his basic plan is sound and his understanding complete enough, he will be able to turn the inspection of the tank to an illustration of the current instruction.

New material, as it is introduced, should follow naturally upon what has been previously learned and be presented simultaneously with a review of that previous instruction.

As a first step in simplification, armored vehicles may be divided into three classes: wheeled vehicles, such as scout cars; half-tracks, such as various troop carriers, prime movers and self-propelled artillery; and full-track vehicles. Because these latter constitute the backbone of any armored attack, because they are the most completely armored, and because they are generally the most difficult to identify, this article and the training program which it presents will deal only with tanks. The principles of tank recognition and identification, however, can be applied to any armored vehicle.

Both recognition and identification of tanks will be considered, and the distinction between these two terms is important. Recognition is concerned only with distinguishing between enemy tanks and friendly tanks. Identification includes recognition, but also involves a further analysis to determine nationality, armament, model and other technical characteristics. Identification provides information of further value in combat because it may make it possible to pick out the particular weakness or vulnerable spot of the target that presents itself, and it may lead to valuable information as to the tactical implications of the presence of tanks of a particular type in a particular place.

The goal of training, then, is to teach soldiers first to *recognize*, ultimately to *identify*, friendly and enemy tanks. The method is to provide a logical program or framework

that will make the most of limited time and facilities despite the complexities of the subject.

To this end The Infantry School employs a "means chart." (See figure 55.) This is simply a framework, a master template into which the characteristics of any tank may be fitted. It is a method of analysis of tank characteristics.

The value of the means chart—or any similar list—lies in the fact that all armored vehicles have certain features in common, yet the construction, location, and shape of these features aid the soldier in fixing the vehicles in his mind.

All nations are constantly improving their present equipment and will adopt or borrow new ideas that have proved to be of exceptional value. New developments in tank design can readily cause the inaccuracy of a rule which previously was sound. All general rules for recognizing friendly and enemy tanks therefore must be constantly reviewed and rechecked. In particular, instructors should check carefully the current accuracy of any statement that certain features are characteristic of the tanks of any nation. Provided these precautions are taken, it will be found that workable rules can be fitted into the pattern of the items of the means chart.

Consider these items singly and in order.

If the tank is seen at a distance, the general silhouette is about all that is revealed. Tank silhouettes, however, are quite distinctive. They should be studied as they appear from the end, the side, and at angles between. The large mass of the tank is the hull, roughly rectangular in shape. (See figure 56.)

FIGURE 56.

Generally there is a rotating turret atop the hull mounting the largest gun with which the tank is armed. Shape,

MEANS
SILHOUETTE
HULL
TURRET
SUSPENSION
SPECIAL EQUIP
AERIAL
MARKINGS
METHOD OF ATTACK
SOUND
ARMAMENT
MOTOR

FIGURE 55.

size, and position of the turret vary considerably. (See figure 57.)

FIGURE 57.

On some tanks the turret is surmounted by a small cupola. This may be centered or offset, and its shape varies considerably. It may provide a clue to the nationality of the tank. (See figure 58.)

FIGURE 58.

Track and suspension systems are of three general types: bogie, caterpillar, and Christie.

A "bogie" is defined by the dictionary as "a small, sturdy truck." As applied to a tank these bogies usually consist of a mounting having two wheels. Each bogie, or truck, is individually attached to the tank. These bogies support the tank on its tracks. The tank is moved forward by means of a driving sprocket which works against the tracks. The driving sprocket may be either to the front or the rear. At the other end of the track system, an idler wheel works against the track to keep it taut. Smaller wheels, each individually hung, work against the top of the tracks and are called "track support wheels" or, in British terminology, "jockies." (See figure 59.)

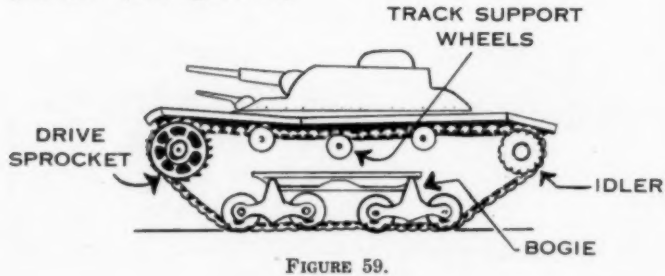


FIGURE 59.

The caterpillar suspension system consists of a series of independently sprung wheels which ride the bottom track, and a series of track support wheels over which the upper portion of the track moves. The driving sprocket and idler wheel mentioned above are also used in this suspension system. (See figure 60.)

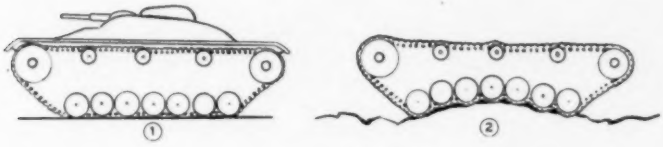


FIGURE 60.

The Christie suspension system is named for its inventor. It consists of a series of large wheels, each of which is independently hung and operates against the track at both top and bottom. The wheels themselves are the drive wheels. Many tanks equipped with this type of suspension can operate without tracks, and over well paved roads their speed is considerably increased by the removal of their tracks. (See figure 61.)

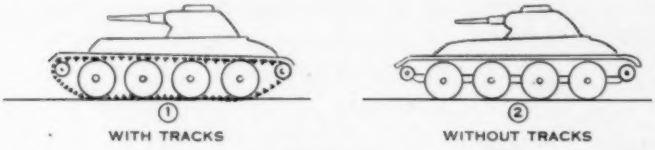


FIGURE 61.

American tanks use a bogie suspension system which is distinctive. It can be remembered as resembling an inverted "T." To some people the general outline suggests a man on a bicycle. (See figure 62.)

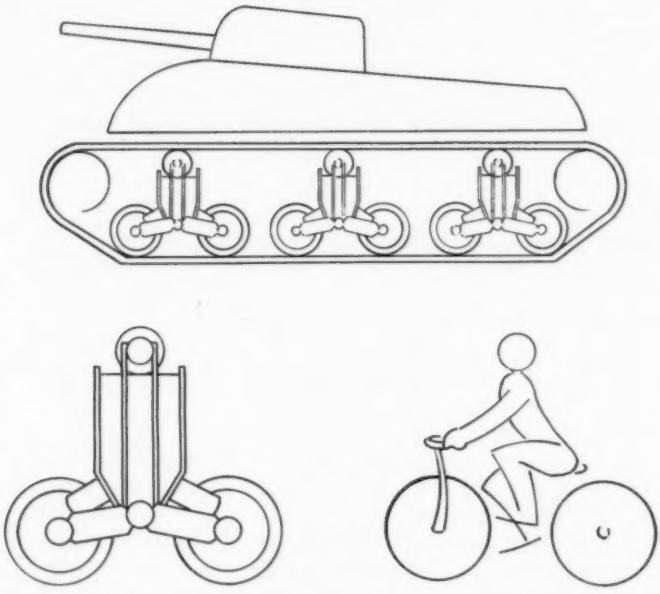


FIGURE 62.

Some suspension systems are protected by an apron of armor. Some appear recessed into the hull because the hull is built out over the top of the tracks, forming sponsons. (See figure 63.)

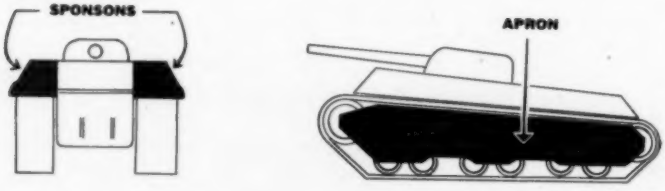


FIGURE 63.

Special equipment on a tank may provide many clues to its identity when it reaches a range close enough to render these details visible. Radio aerials may be mounted either on the turret or the hull. Sometimes the aerial is in the form of a circular rail extending around the turret. (See figure 64.)

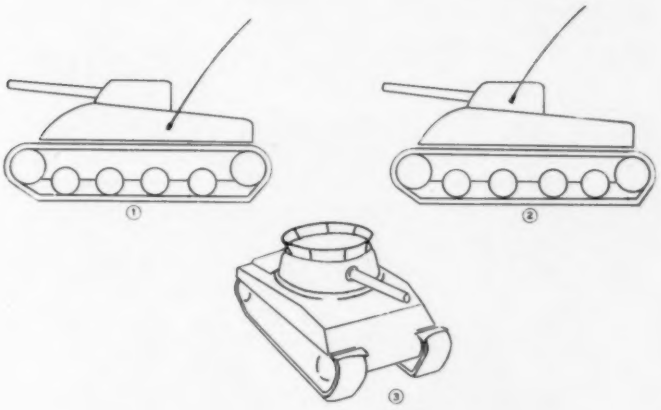


FIGURE 64.

The manner in which the guns are mounted; provisions for vision, whether slits, mirrors or periscopes; arrangement of louvres or grills for ventilation; placing of track links and grousers on the outside of the tank where they provide expedient additional armor as well as being transported without taking up interior space—all these are but examples of items which may be peculiar to a particular model of tank.

Tanks of each nation are marked with insignia peculiar to that nation. In some cases they are the same as those used on aircraft. (See figure 65.)

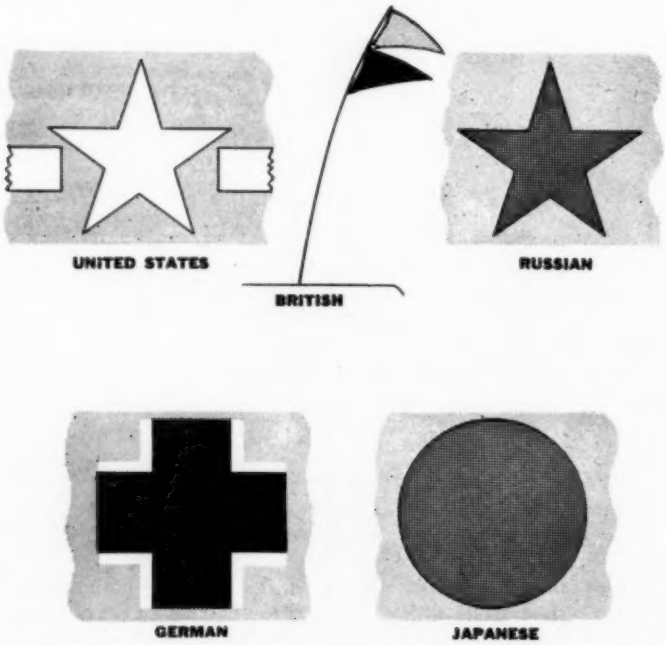


FIGURE 65.

In addition to the above markings certain other markings may be used in a given theater of operations. For example in the North African theater, British tanks could be recognized by their use of flags and pennants flown from their radio aerials. Such pennants are the only markings ordinarily employed on British tanks. The colors and sequence of these flags were changed frequently to permit secrecy. Thus captured tanks could be used and recognized as being friendly. (See figure 66.)

FIGURE 66.

The noise made by a tank's engines, as well as the firing of its gun or guns, will rarely aid in tank *recognition*. But these sounds may be distinctive and prove of great help to the well trained observer in making precise identifications. Diesel-motored tanks and those with automobile-type engines are less noisy than those with airplane-type engines. Skill in tank identification by sound cannot ordinarily be acquired in pre-combat training.

Familiarity with the maneuvers and tactics of tanks, like the noise they make, is not usually attained until actual combat is reached. Formations, methods of approach, and manner of coordination with other arms, all disclose differences characteristic of the nation to which the tanks belong.

APPLICATION OF THE MEANS CHART

During the training in tank recognition and identification the means chart provides an outline by means of which tank models or silhouettes may be analyzed. As concrete examples, analyses of three tank silhouettes are given below. These silhouettes were taken from the weekly "Newsmap" of 18 January and 22 February 1943, prepared and distributed by the Army Orientation Course. Tank pictures and silhouettes appearing in the public press can be similarly analyzed and used as training aids.

U. S. LIGHT TANK M5.—(See figure 67.)

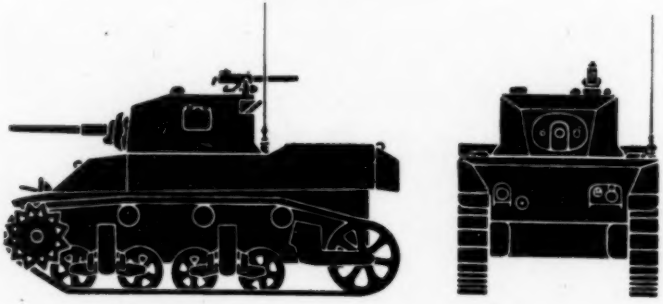


FIGURE 67.

SILHOUETTE: Note the square, upright appearance, the straight lines, the rather symmetrical shape. The turret is rather symmetrically placed on the hull of the tank, and has almost vertical walls. The hull overhangs the suspension system to the rear.

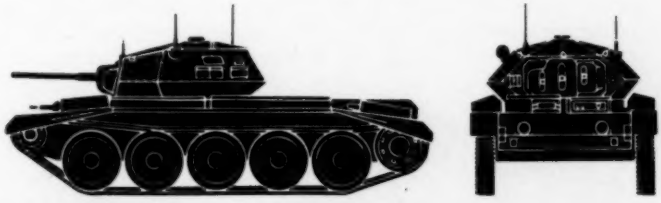
SUSPENSION: Characteristically U.S. with two bogie mountings on each side. Again, note the inverted T appearance of the bogie mounting, and fix it in your mind. It is usually American. Note that on this tank the idler wheel is a trailing idler; that is, it supports part of the weight of the tank. The driving sprocket is to the front.

SPECIAL EQUIPMENT: The M-5 tank has its largest gun mounted in the turret. A machine gun is mounted on top of the turret and another protrudes from the front of the hull. The aerial is mounted on the hull.

MARKINGS: Official marking for U.S. tanks is prescribed by army regulations as a white band around the turret with one large five-pointed white star on each side, a large white star on top of the turret, and a smaller white star on the rear of the hull.

SOUND: This tank is quiet in operation except for the characteristic clattering of the suspension system.

BRITISH MKVI ("Crusader").—(See figure 68.)



BRITISH CRUISER TANK MK VI, "CRUSADER"

FIGURE 68.

SILHOUETTE: The turret of the "Crusader" is streamlined, undercut, and diamond-shaped. It is of riveted construction and mounts a cannon and machine guns. The turret is set well forward on the hull of which there is little visible above the fender line. This gives the tank a low "greyhoundish" appearance. A driver's cab is located on the right, and a subsidiary machine-gun opening on the left of the hull.

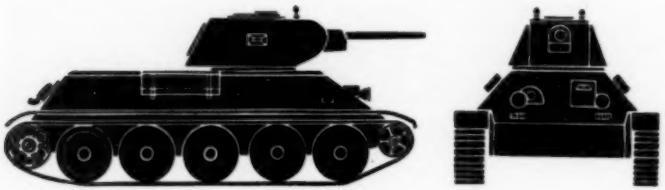
SUSPENSION SYSTEM: The Christie suspension system on this tank consists of five, evenly spaced bogie wheels touching top and bottom of the track. There are no jockey wheels. The front idler is unusually small and there is a driving sprocket located at the rear. This sprocket and idler are partially covered by light metal mud guards.

SPECIAL EQUIPMENT: Two aerials are mounted on the rear of the turret and at least one is equipped with a flag hoist operated from the turret. It is reported that in actual operations, the distinguishing characteristics of British combat vehicles are often hidden because of the large amount of duffle, gasoline tins and other impedimenta tied to the exterior of the tank.

MARKINGS: Normally the British do not mark their tanks with the standard R.A.F. insignia. They use a system of serial numbers and letters which are prominently displayed on the turret. On occasions the concentric red, white, and blue circle insignia has been used. They depend in large measure on signal pennants flown from the aerial as an aid to recognition.

SOUND: No information is available as to the sound of this tank's motors and guns.

RUSSIAN T 34.—(See figure 69.)



RUSSIAN CRUISER T 34

FIGURE 69.

SILHOUETTE: The silhouette of the T 34 is quite unusual in appearance because it is very wide and low. The turret is placed well forward on the hull to provide room for tank-borne troops which are often carried on the deck-like part of the hull, behind the turret. The sides and rear of the turret are sloped at about a 60 degree angle. The front slopes at about a 30 degree angle for a short distance and then curves up and to the rear until it meets the flat top of the turret. On top of the turret are two periscopes and an escape hatch. Pistol ports are conveniently located on the side. The hull sides, rear, and front are sloped at approximately a 45 degree angle and the top is flat. The

front hull surface mounts the lighting equipment, indirect vision devices, and one machine gun. The tank is one of the widest in use, and is half as wide as it is long.

SUSPENSION: The suspension system consists of five, evenly spaced Christie-type bogie wheels. The front idler wheel is abnormally small and a driving sprocket is located in the rear. Symmetry characterizes the general appearance of the system.

SPECIAL EQUIPMENT: This tank is typically Russian in that it carries very little superfluous equipment. However there are racks on the sides of the hull for spare traction equipment and in actual operations the hull might be covered with other impedimenta belonging to the crew.

MARKINGS: The standard Russian marking is a large red star painted on the turret and hull. A red hammer and sickle insignia might be used in conjunction with the red star or by itself.

SOUND: No information about the sound of the power plant is available.

METHODS AND MEANS OF TRAINING

Means charts and tabulations of characteristics do not in themselves produce a course of training in tank recognition and identification. They do, however, provide both instructor and pupil with a standardized form of proceeding which may be employed throughout such training. The most logical plan of training confines the early training to U.S. tanks, subsequently broadening it to include tanks of Allied nations. Hostile tanks should be the subject of training only after the trainees have gained great familiarity with all friendly tanks. If undertaken too soon, training in recognition and identification of hostile tanks will lead to fatal confusion. If not undertaken until the theater of operations is reached, little harm is done, since sound knowledge of all friendly models makes it a safe rule to fire on all unfamiliar models that may be encountered in combat.

This idea is summed up by our slogan, "Don't fire on friendly tanks!" And this order of training has led to the practice of postponing any training in hostile tank identification until the destination of the particular unit has been

determined. As soon as it is known what theater of operations is the destination of the unit, training in enemy tank identification can be undertaken, and can be confined to those types which will probably be encountered in that theater. The system does not mean, however, that models and silhouettes of enemy tanks cannot be used for testing purposes, since they will constitute the *unfamiliar* models which, by definition and principles of training, are *hostile*.

Even though American tanks will provide the entire subject matter of early training, it is obvious that actual tanks will not be available for parking in the company street, maneuvering on the drill field, and otherwise being placed where the men will become familiar with them by closeness of actual association. Yet this close association, seeing and observing casually, at all hours, off duty as well as on, which is called "passive instruction" is a very major part of any successful training program. Formally scheduled hours will hardly be more than sufficient to explain the means chart, analyze the various tanks according to its terms, and test the growing proficiency of the pupils. That proficiency can grow at a satisfactory rate only as the result of observation—repeated and repeated again.

If the men must constantly observe tanks, and there are ordinarily no tanks to be observed, we would seem to be blocked at the very outset. What is the solution? Silhouettes, pictures, punch-out models, plastic and metal models provide a variety of training aids. In combination they can be made very effective. Such material can be displayed in the day room, recreation hall, mess hall, latrines. This passive instruction is nothing more or less than advertising, a field in which American talent is peculiarly at home, and all the tricks of the trade should be used. Appropriate field manuals and training manuals should be made easily accessible. Film strips and training films can play a major role in instruction if continuously presented. One might be shown before each moving picture show in the evening.

Issue training aids may be greatly augmented by the establishment of a clipping bureau. Two or three of the men who show particular aptitude for and interest in the sub-

ject may be entrusted with this project. Not only official and semi-official publications, but magazines and even newspapers, particularly in their advertising pages, contain many illustrations that may be used. If these illustrations are to be used primarily to teach rather than to test, their value will be greatly increased if captions are added, including at least the name and nationality of the model; or, even better, a list of a few of its salient characteristics. Almost all units include some individuals who can fashion scale models and mockups of tanks. Similarly most units include some members with sufficient artistic skill to produce silhouette charts from newspapers and magazine pictures of tanks. (See figure 70.) Of the many uses to which such talents can be put, some are discussed below.

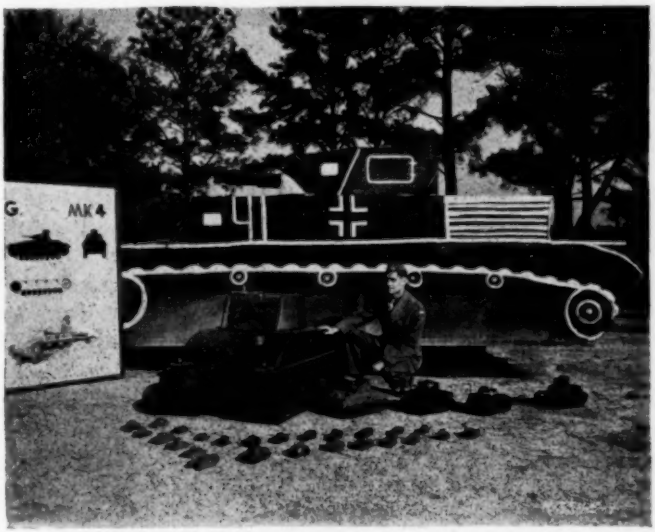


FIGURE 70.

Model tanks, either the work of handy men in the company, or made by civilian manufacturers, will greatly add to the instruction and interest in identification. Used individually, characteristics of the tank can be stressed and fixed

in mind. To stress certain parts of a tank on these small models, the parts themselves can be lightly coated white with chalk or whitewash. Later, they can be cleaned off. Once the tanks have been learned individually, good use of models may be obtained in sand table problems of identification. For any parts which are not easily discernible on the models, again stressing these parts by chalking them will prove effective. An ultimate in this procedure should require an observer to view a well prepared sand table for a limited time, then to identify the tanks seen. Skill can be increased by shortening the time allowed, and increasing the number of tanks displayed.

This same procedure may be followed by using full-sized mockup tanks in the field. Constructed of wood and canvas or target cloth, and built to fit over a ¼, ½ or ¾-ton truck, they will prove valuable in tactical exercises involving tank identification procedures. Plans for mockups can be made from pictures or from the small-scale models.

It will be found that a greater amount of formal training in tank identification will be scheduled for the antitank company and platoons than for any other units in the regiment. The alert company officer will check on these antitank training schedules. He may find it possible to include his unit as observers at certain of these scheduled periods. In other instances he may be able to borrow the equipment and training aids used by an antitank unit for use by his own men in a following period.

After the initial phase of tank identification training—general orientation, explanation of the means chart, and display and analysis of individual U.S. tanks—continuity should be the guiding principle in all further training. This principle is borne out in two ways.

First there should be repetition and review. Never should opportunity be given to forget something that has been once learned. Interest may be sustained despite this repetition by testing the men on the same material but under varied conditions. At first this variation may be attained by displaying uncaptioned tank pictures and calling upon individuals to identify them, shortening the time during

which the picture is exposed for each successive test period. The opaque projector described in another chapter of this volume is especially useful for such test periods.

The second aspect of the principle of continuity, which also serves to prevent loss of interest, is the graduated increase of instructional content. This simply means that a little new material—perhaps one more tank, or one more characteristic of several previously studied tanks—should be added during each training period. It is like a high jumper in training who starts every day with the bar at the same height, thus always repeating previous training, and finishes every day with the bar one inch higher than the greatest height the day before, thus adding something new each day. An additional expedient in stimulating interest in a very practical way has been used by certain units with reported success. A brief, spot-check test, progressively more difficult, is required of any man requesting a pass. If the test is not met satisfactorily, the pass is not given.

As training progresses, both variety and increasing practicality may be obtained by adapting tank identification materials to other parts of the unit training schedules. Tank silhouettes have proved highly interesting and instructive as targets for 1000″ firing. Gunners are scored on their ability not only to hit the enemy tanks, but to desist from firing on friendly tanks. Since each of these tank silhouettes is individually pasted, each target can be entirely different, and so test the firer's skill in recognition of all tanks studied.

Despite the excellent results that may be obtained with issue and improvised visual training aids, it must be admitted that none of them are exactly like a real tank. Its motion and noise cannot be simulated by anything else. Therefore any opportunity to bring the men in contact with real tanks should be exploited to the utmost. The benefits obtained will fully repay a little extra marching in order to observe and inspect them. The men should be allowed and

encouraged to make thorough and detailed inspections, discuss the tanks with each other and with well-informed instructors, and view them from all angles and at various distances.

To be sure that the latest available training aids are utilized to the full, Field Manuals 21-6 and 21-7, listing the various publications and visual aids, respectively, should be consulted, as well as War Department training circulars. The "Newsmaps" distributed by the Army Orientation Course, as well as the various service journals, also contain valuable material for this training. Magazine and newspaper pictures of armored vehicles should be posted, and all other possible means of passive instruction should be utilized. Motion pictures, both commercial or War Department, that contain pictures of tanks and other armored vehicles should be seen by the men. Every opportunity to inspect and climb all over our own tanks, looking at them from all angles, riding in them, getting to know them inside and out, should be seized. To be able to recognize them at all ranges, under the hardest circumstances, is a "must" for every soldier.

CHAPTER 10

Improvised Mats for Moving Vehicles over Soft Terrain

Moving vehicles across soft terrain has been a serious military problem ever since the first war chariots were invented, and modern expedients do not differ essentially from those used centuries ago. For example, it is effective now, as it was in the time of Julius Caesar, to cut and sink branches and small tree trunks in mud and water across a line of vehicle travel. This distributes the weight over a wider area and increases the degree of flotation. A great variety of improvisations and improvements have been made on this "corduroy road," which is also known as a "stake road," but the basic idea is very old.

After the invasion of Poland, the author of an article in *Artilleristiche Rundschau* described some German expedients for crossing sandy or swampy terrain:

> When the going became extraordinarily bad, we knocked down wooden fences along the way and built makeshift stake roads over the ruts. The last men across loaded the material onto their vehicles in order to have it at hand where there were no fences along the way.
>
> . . . . Sometimes swamps were encountered and our fences were of no avail. We halted, cut down a few trees, sawed them into pieces of about twice the width of the vehicles, filled the swamps with the branches and put the trunks of the trees on top. Thus we provided a stake road that held out long enough for the whole battery to cross. Spots that became weak as the vehicles rolled over them were reinforced.

The most satisfactory form of temporary road for military use is a prefabricated mat 6′ by 12′, made of saplings held in place either with poultry wire and baling wire, or

with baling wire alone. For lighter vehicles, where the terrain is not too difficult, a mat four feet wide may be used. The larger mats are especially useful for vehicles moving across country in an area including low swampy stretches or other soft ground which cannot be avoided. If the need for them can be foreseen, the mats may be constructed in advance in the bivouac area and carried on trucks. It is desirable that each truck larger than the ¼-ton carry at least two mats.

If necessary, such mats may be constructed on the spot by trained personnel. In particular, personnel of battalion ammunition and pioneer platoons should be trained in the rapid construction of these mats. Baling wire (and poultry wire, if it is to be used) should be provided in advance, for these materials may not always be obtained along the route of march. In populated areas, materials may be found in limited quantities by scouting the countryside, but it is best not to depend on this.

To procure the saplings, search second-growth forests for young trees which have grown quickly, with few branches below the six-foot mark. Here they will be straightest and most uniform. Saplings may also be found in the thick growth along country roads.

The following points should be remembered while cutting and gathering saplings:

1. Considerable time is saved if one detail cuts poles and another gathers and loads them into the trucks.

2. Men are prone to cut too large saplings. They should be thumb-size and green, so that they will bend, and not break, under pressure.

3. The entrenching axe will probably be readily available for cutting poles of this size, although a heavy knife, machete, or meat cleaver might prove superior, especially if the poles must be trimmed of branches.

4. A 1½-ton truck properly loaded will carry approximately 1,200 poles. A 2½-ton truck with the top on or using aprons will easily carry 2,000.

To cut the poles to proper length (see figure 71), a wood block or log is staked in place at a distance of four or six feet from a tree or other solid object. The pole is placed with its end against the tree and cut where it lies across the block. Two men are necessary to supply the man who

FIGURE 71.—A quick method of cutting the poles to proper length.

cuts. Another man gathers the poles after they are cut to the proper length and places them in a level, cleared space in the position they will occupy in the finished mat. The large and small ends are alternated.

Sapling mats 12 feet in length with poles 2½ inches from center to center, require about 60 poles each. While the poles are being cut and placed, a detail of two men should be assigned the task of preparing the wire. The

baling wire is used in 36-foot lengths. Three such lengths are required for each 4′ by 12′ mat, four lengths for each 6′ by 12′ mat. Each of the 36-foot lengths of wire is doubled to form two strands 18 feet long. The doubled ends are tied to a pole, one wire 4 to 8 inches from the end of the pole, with the remaining wires equally spaced along the pole. This will give a space of from 16 to 20 inches between the wire ties along the pole. The loose ends of the doubled wires are tied to another pole in the same manner.

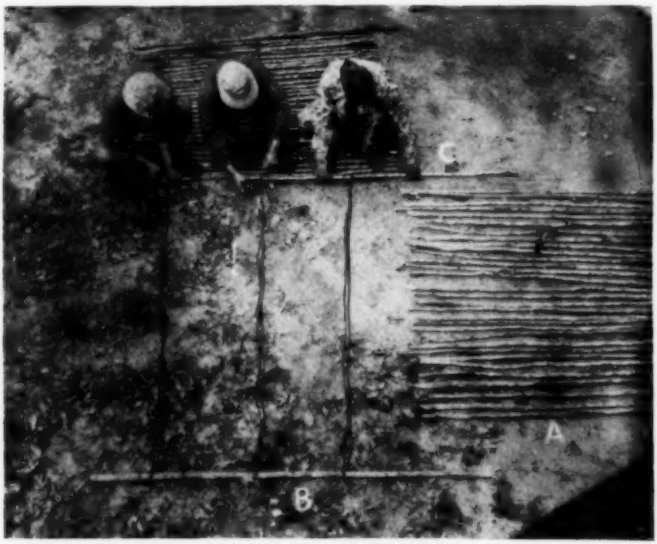


FIGURE 72.—Method of Fabrication of Mats. Note the following:

1. Row of poles at A are placed with alternating large and small ends and approximately the same distance apart as in the finished mat.
2. Pole at B used to hold the wires. This pole is not staked.
3. Method of slipping poles between the wires shown at C.

To fabricate the mat, the men take positions similar to those shown in figure 72. The man on the left feeds the poles between the doubled wires. When the pole is even

with the preceding pole, each man twists his double wire three times. If more space between poles is necessary, more twists are made. The next pole is inserted and the wires are twisted in the opposite direction from the previous twists. By alternately twisting the wires in opposite

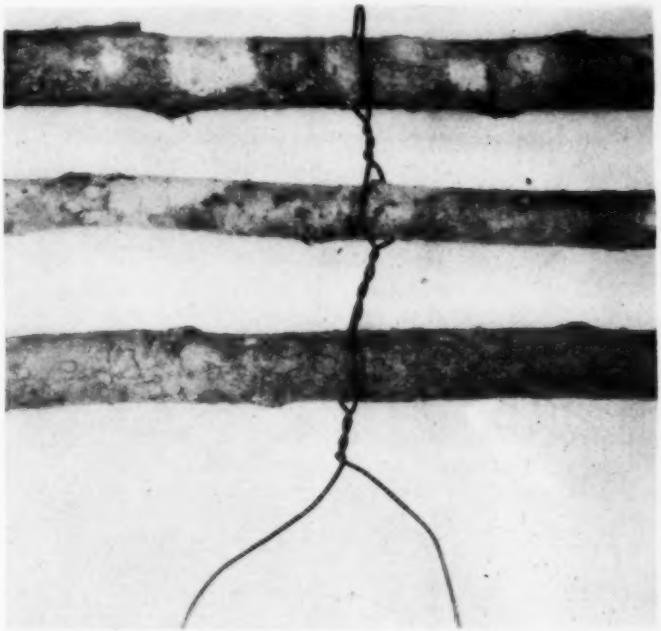


FIGURE 73.—Details of construction of the thumb-size sapling mat using baling wire with poles 2½ inches center to center.

directions, the twists which were placed in the unused portion of the wire are removed and the wires are again parallel. No pliers are needed in making this type of mat. Details of construction are shown in figure 73. One man is used for each wire; therefore, mats tied in three places will require only three men, but will take the same time to fabricate as the 4-wire mat. The men should wear gloves in order to increase the speed of their work and to

prevent the wire from blistering their hands. With a little practice a crew can make a sapling mat in 15 minutes. Finished 6′ by 12′ mats are shown in figure 74.

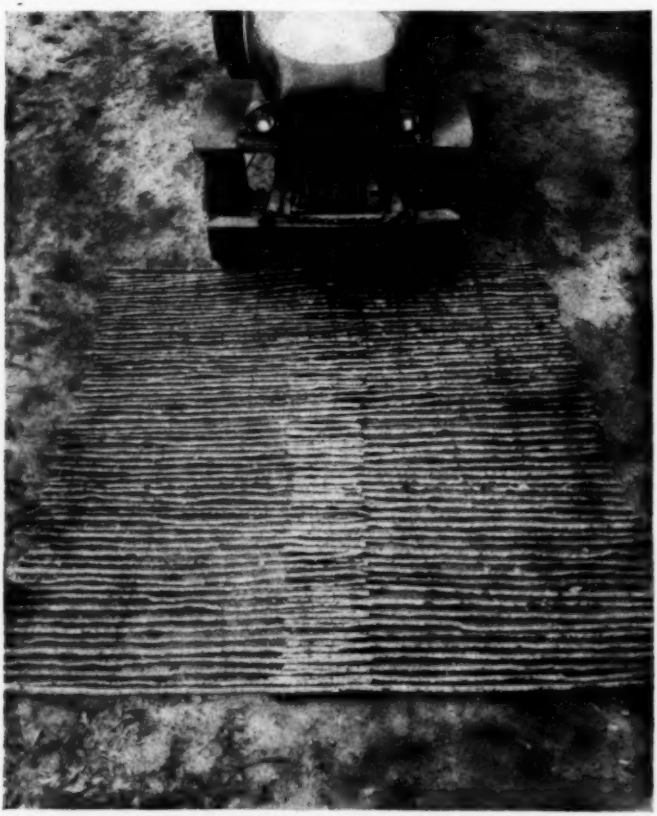


FIGURE 74.—Six-foot sapling mats 12 feet long with thumb-size saplings 2½ inches center to center. Note the one-foot overlap in center with ample space on each side of 2½-ton truck.

For the poultry-wire mats, poles are spaced at approximately 6-inch intervals, using a total of 20 to 25 for each 12-foot mat. The wire is cut in 12-foot lengths, placed

next to the poles and smoothed down flat. Breaks are repaired if they are not too large. Wire with tears larger than 12 inches in diameter should be cut completely across at the hole and then spliced.

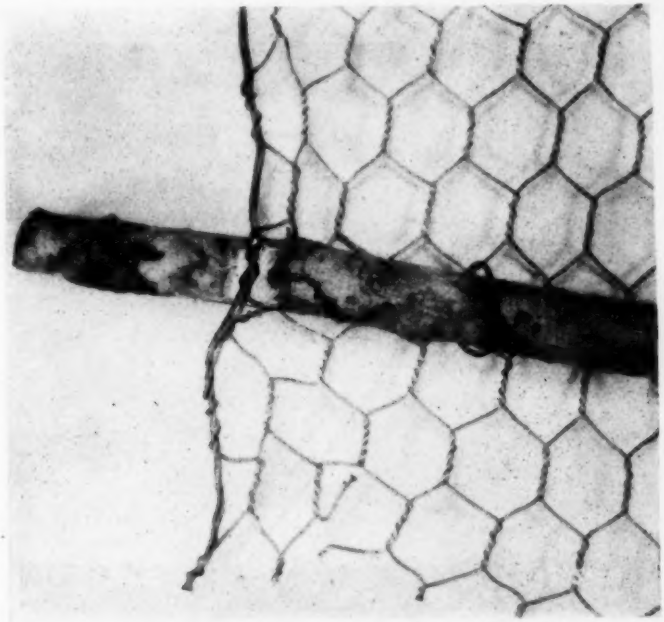


FIGURE 75.—Close-up of Poultry Wire Mat.

Note the pole inserted through the last mesh at outer edge of wire. Note also method of fastening pole to poultry wire by tying with a short piece of baling wire. Pliers are not essential, but their use will permit more rapid work.

To fabricate a 4′ by 12′ poultry-wire mat, three men take positions similar to those shown in figure 72. For the 6′ by 12′ mat, four men take positions. Each man should be equipped with a pair of wire-cutting pliers and one 6-inch length of baling wire for each pole to be used. If no baling wire is available, the poles may be woven into the poultry wire by passing them through a mesh every

6 or 8 inches. In any case, the poles should be inserted in the two meshes of the poultry wire nearest either edge, as shown in figure 75. Two finished mats are shown in figure 76. With practice it takes about one-half hour to make a mat of either width.

FIGURE 76.—Four-foot poultry wire mat 12 feet long with thumb-size poles 6 inches center to center.

As the mats are completed, each is rolled up tightly and tied securely at both ends. (See figure 77.) The size and

weight of these bundles will depend upon the thickness of the poles and how tightly they are rolled. The approximate size and weight of each bundle is as follows:

A 4′ by 12′ sapling mat with poles 2½ inches center to center is 14 to 16 inches in diameter and weighs approximately 60 pounds.

A 6′ by 12′ sapling mat with poles 2½ inches center to center is 14 to 16 inches in diameter and weighs approximately 100 pounds.

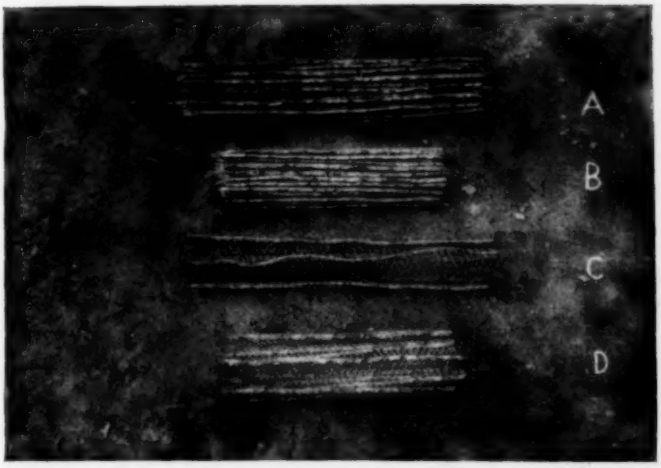


FIGURE 77.—Mats rolled into bundles ready for transportation.

A. Six-foot sapling mat
B. Four-foot sapling mat.
C. Six-foot poultry wire mat with poles 6 inches center to center.
D. Four-foot poultry wire mat with poles 6 inches center to center.

A 4′ by 12′ poultry-wire mat with poles 6 inches center to center is 9 to 12 inches in diameter and weighs approximately 30 pounds.

A 6′ by 12′ poultry-wire mat with poles 6 inches center to center is 9 to 12 inches in diameter and weighs approximately 45 pounds.

When used in swampy or soft terrain, the mats are spread to form a roadway at the point selected for crossing. Small trees, branches, weeds, and vines placed under the mats and parallel to the line of travel will reduce the necessary number of layers of mats. In using a single mat, it is best to place it so that the saplings are across the line of vehicle travel. The second layer of mats can be placed the same way or with the saplings parallel to the line of travel. The six-foot mats are overlapped one foot at the center when laid across the line of vehicle travel. Experience has shown that the maximum difficulty will occur not in the deepest part of the swamp, but at each end of the mat bed. The first and last mats in the roadway should extend at least eight feet on the hard bank and the ends which are on dry ground should be staked and buried. The other end should overlap the next mat one foot. If possible, steep banks should be cut to a more gentle slope. In order to move a column of vehicles at greater speed over a soft area, two or more mat roads should be built. High speeds are not practical on mat roads because of the strain on the vehicle, and because such speed will break the mats.

In a test conducted in a swamp where the soft mud was about one foot deep, it was found that a ¼-ton truck was mired by backing the truck so that only the rear wheels were in the swamp. A 2½-ton truck which tried to cross sank so deep it had to be winched out. As soon as it was determined that no vehicle could go through this terrain, mats were spread over the surface. One layer of mats was sufficient to carry a ¼-ton truck loaded to capacity—total weight 2,700 pounds. (See figure 78.) Two layers were needed to support a loaded ¾-ton weapon carrier (5,200 pounds), and this number also supported a 1½-ton truck (10,300 pounds) and a 2½-ton truck (15,500 pounds) in stretches where the mud was not too soft and where branches had been placed under the mats. In very soft and deep mud, 3 layers were needed for the heavier

trucks. Four or five layers of mats will allow the vehicles to cross at a higher rate of speed while using less power.

Mats made with saplings of four feet and less in length and more than 1¼ inches in diameter were tested and found to be of little value. They do not have the "give" or resiliency of the thumb-size saplings, which create a trough out of which the trucks cannot easily slip. A 1½-ton truck had difficulty when trying to negotiate a swamp by means of two sets of mats—one, made of three-foot arm-size saplings, for the right wheels, and the other, a double

FIGURE 78.—¼-ton truck loaded to capacity crossing over stake road of one layer of mats.

layer of four-foot poultry-wire mats, for the left wheels. The right wheels of the truck tilted the mat of three-foot arm-size saplings to such an extent that another truck passing over might have slid off the mat. Even if the truck had followed the exact center of the artificial road it would have been found that in some places the mud, or foundation, was softer than others, and that the mat would have tilted and partly submerged in the water and mud. Wide

mats made from large saplings give very good results, and their use is feasible if the distance they are to be transported is short and if they are to be left in place after use.

Recovery of the mats is determined largely by the type of foundation upon which they are set and the number of vehicles crossing them. Deep mud without grass or branches as a foundation will make recovery difficult, if not impossible. Ordinarily, about 80 percent of the mats can be recovered. The difference in weight of the mats before and after use is negligible.

Use of these mats over deep, loose sand increases the degree of flotation of the vehicle and permits greater speed and lower fuel consumption. One layer is usually sufficient for all vehicles of the infantry regiment. Two layers will allow slightly faster traffic, particularly after the mats have been buried in the sand about two inches. Going upgrade, trucks have a tendency to push the mats downhill; therefore, they should be wired to each other and to solid objects along the roadside. Care should be taken to avoid sudden starting and stopping of vehicles.

The type of mat to be used will depend upon the terrain problem confronted, the size, weight, and number of vehicles which use it, the materials at hand, and the time available for construction.

Generally speaking, it would be advantageous to use the 6′ by 12′ sapling mat in swampy areas, particularly if trucks larger than the ¼-ton are to cross. This mat is stable, does not buckle or slide, and has good wearing qualities. It is superior for use over sand, although the relative stability of sand as a foundation makes the 4′ by 12′ mat almost as successful. The 6′ by 12′ sapling mat has two main disadvantages—its weight, about 100 pounds, and its volume, about 8 cubic feet.

In flooded areas, where water several inches deep covers a soft, muddy bottom, or when it is necessary to reinforce a stream bed at a ford, the 6′ by 12′ poultry-wire mat is more desirable. It sinks easily under water, sticks to mud bottoms more readily than other types, and weighs considerably less. It should be remembered, however, that poultry wire is difficult to obtain, that the time necessary to construct this mat is somewhat greater, that it cannot be used for as many purposes as the sapling mat, and that it has a tendency to buckle.

Mats constructed in advance in the bivouac area have many additional uses:

1. Walkways in muddy places in the bivouac area.

2. Tent floors where the ground is very damp.

3. Platforms on which to pile equipment and food supplies that might be damaged if placed on the ground.

4. Fills (using the mat rolled) for natural ditches or ditches dug across the road by the enemy.

5. Emergency repair of bridge platforms.

6. Covers for trench and gun emplacements with camouflage materials placed on top.

7. Dummy bridges to deceive enemy air observers.

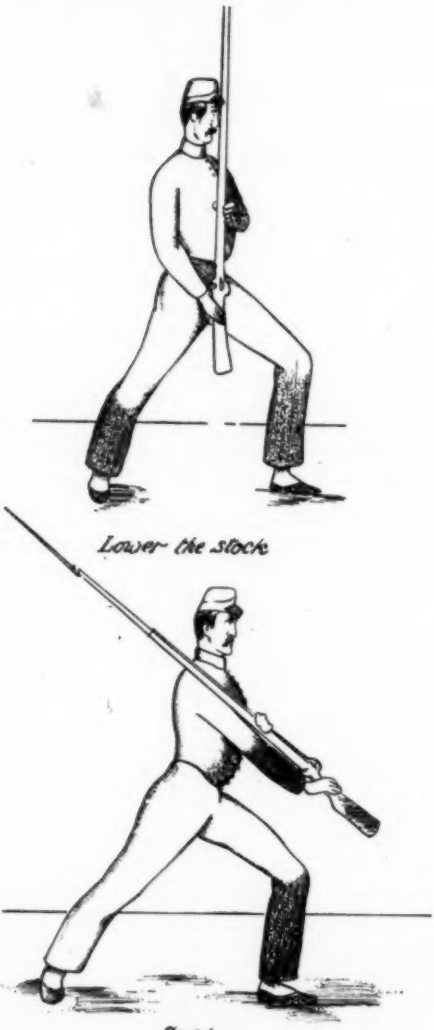
When baling wire or poultry wire is not available for constructing mats, expedients can be devised from material obtained along a line of march. Picket fences, livestock-wire fences, chain-wire fences, and snow fences cannot only be turned into stake roads but recovered and carried in the vehicles for later use. Lumber from buildings and posts or rails from fences often can be successfully employed as fills in soft terrain. Any material, in fact, which provides flotation and traction is satisfactory.

CHAPTER 11

Contrast

The illustrations on the following pages show the contrast between manual presentation of almost a century ago and that of today. The old pictures presented are reprinted from "Manual of Bayonet Exercise," translated from the French by Captain George B. McClellan, and printed "By Order of the War Department," in 1852. The contemporary counterparts of these illustrations have been reproduced from the 1943 revision of Field Manual 23-25.

OLD



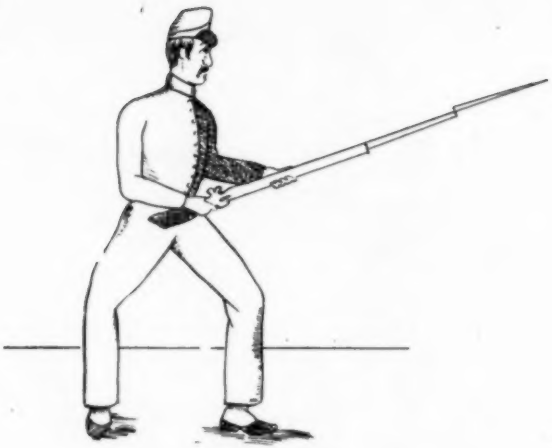
BLOW WITH THE BUTT
TO THE FRONT

FIGURE 79.

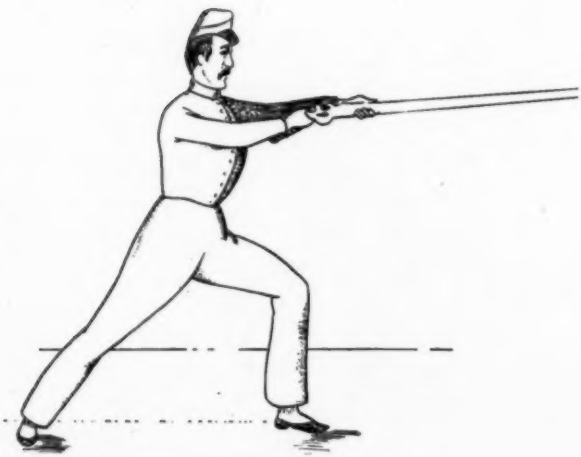
NEW

FIGURE 80.—Vertical butt stroke.

OLD



GUARD



Movement Completed

THRUST WITH THE PASSADE

FIGURE 81.

NEW

FIGURE 82.—Long thrust.

OLD

Front view

PARRY IN QUARTE

FIGURE 83.

NEW

FIGURE 84.—Parry right.

CHAPTER 12

Battlefield Dope

From adequate and timely military intelligence the commander is able to draw logical conclusions concerning enemy lines of action. Military intelligence is thus an essential factor in the estimate of the situation and in the conduct of subsequent operations.

Field Service Regulations (FM 100-5, par. 194)

Battles seldom progress according to prearranged plans. Having once been commenced, so many factors affecting the commander's subsequent decisions are hidden in uncertainty that the apt phrase, "fog of war", has been coined. The successful commander is the one who penetrates this fog by properly evaluating and interpreting the thousand and one scraps of information which reach him, and then acts vigorously and intelligently to accomplish his mission on the basis of what he has learned.

Without such evaluated and interpreted information from air and ground sources, which constitutes combat intelligence, the commander would find himself groping blindly through the "fog of war" during the entire battle. What chance he might have for success under such a condition is so obvious as scarcely to merit discussion. It is, however, worthwhile to touch on certain of the means, other than those of specifically designated intelligence units and personnel, by which the information he requires may be placed at his disposal.

These means should be found in the trained powers of observation of every individual soldier — combat troops, truck drivers, cooks, mechanics; whoever they may be, whether participating directly in the fight on the battlefield, or contributing their share in an administrative capacity to the troops so engaged. Each should be able and ready at

all times to supply a certain proportion of the information required by the commander to bring the engagement to a successful conclusion; in other words, to furnish his share of valuable "battlefield dope."

Regularly constituted intelligence personnel are doing a better job every day, what with study and sound application of the principles and processes described in training literature, training films and film strips. They have learned to correct past mistakes, and to take advantage of many opportunities to develop and improve their current knowledge. This personnel, consisting in the main of individuals who show a special interest in or aptitude for intelligence work, realize the importance of their job. They are men of enthusiasm and initiative, and the officers responsible for their instruction know that the time and effort expended upon this instruction are yielding generous returns.

There are, however, occasional lapses in all ranks. One observer of the North African campaign relates how a certain regimental S-2 had an ideal set-up at the command post, with red and blue pencils, map rollers, maps covered with cellophane, and other paraphernalia in abundance. Yet at midday he had no information regarding a battalion of the regiment which had commenced its attack at daylight. Inquiry regarding the situation of this battalion elicited the response, "We don't know, sir; they have not sent back any information." Needless to say, he was instructed very promptly and emphatically that thereafter intelligence personnel would get out and secure information wherever it was developing. Fortunately, this incident is in no sense typical.

However, the small groups of men in the intelligence units can scarcely be expected to cover the entire area in detail. Small-unit commanders, all the way down to squad leaders, who are most likely to know what is happening in their own zones, should continually send back pertinent information (see figure 85), thus aiding adjacent units, higher headquarters, and indirectly aiding themselves. Since no one is more closely associated with the events of

the battlefield than the individual soldier whose every act is a part of these events, it is logical that he must be trained to furnish his leaders with this all-important "battlefield dope."

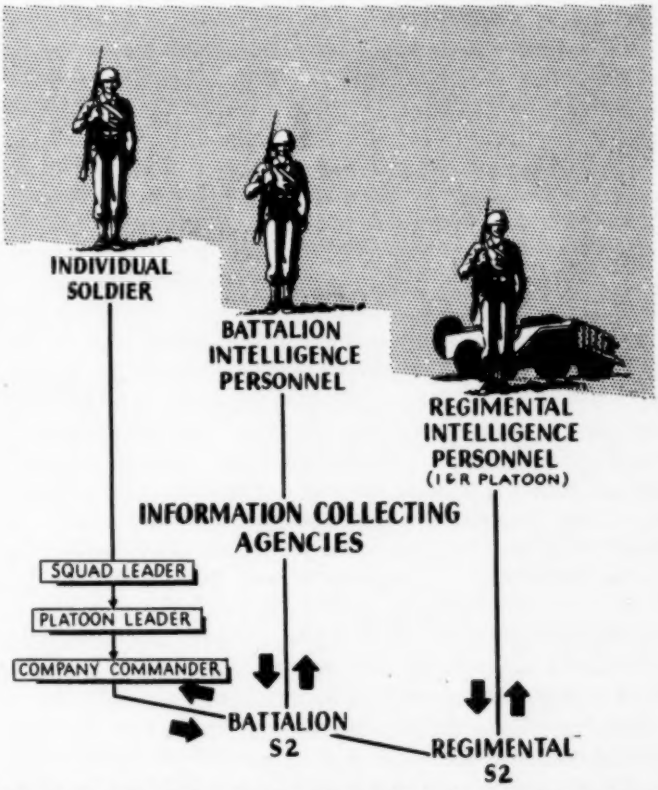


FIGURE 85.—Channels of information within the infantry regiment.

Such training, paralleling that of intelligence personnel, should emphasize the necessity for developing the soldier's latent powers of observation so that he will be aware of all enemy activity within range of his vision and hearing; and able to interpret its military significance within the

limits of his experience. He must, furthermore, learn to orient himself on maps and terrain so as to plot his information accurately. Having plotted or recorded it (unless a verbal report will suffice) he must, as soon as the opportunity presents itself, start it on its way through command channels to the rear.

Under present training programs, many hours are devoted to the specialized training of battalion and regimental intelligence personnel. Other infantry soldiers receive only a few hours of instruction in combat intelligence. The time for practice in observation and interpretation of battlefield incidents is not available to these men except concurrently with their other training, and they can develop this necessary skill only by means of practice. Instructors and unit leaders should stress this practice and introduce it whenever possible into the general training of the unit. The soldier must realize that when he makes a contribution to the production of good combat intelligence, he is assisting his commander in the accomplishment of his mission in the shortest time and at the smallest cost. Thus, in conscientiously collecting and sending back information, he is also aiding himself and his comrades. It must be stressed, however, that the collecting and reporting of information must *never* be done at the expense of his principal duty—fighting, in the case of the man behind the gun.

Once the average man gets in the proper frame of mind, he will respond more readily than is generally recognized. On every hand, prior to and after his entry into the service, he is made acquainted with all phases of our own and of enemy activity. The popular weekly magazines, profusely illustrated, contain minute descriptions of booby traps, jungle tricks and deceptions, and enemy customs and habits. Newsreels carry up-to-the-minute coverages of world events. Radios carry messages of day by day happenings into every home, factory, barracks. It was said that during certain days on Guadalcanal, when during lulls in the fighting the troops tuned in on San Francisco, they received detailed news of the progress of their own battle.

Certainly this constant and minute chronicling of events on the battle fronts everywhere has made both soldiers and civilians more observation-conscious. Gone are the days when one could perpetrate the hoax which attracted so much (subsequent) attention in a large Eastern City. It will be remembered that a pair of newspaper reporters, clad in Nazi regalia, openly walked about the streets and docks. No one questioned them; no one raised a fuss or molested or inconvenienced them in any way. The affair made quite a sensation in the press when it was written up. No, such a thing certainly could not happen now. And it is not just because we have gone to war with Germany. It is because every man, woman and child in this country has been keyed to a higher state of alertness, an awareness of what is going on in the world.

Granted that such a state of alertness and awareness does exist among soldiers, as well as civilians, there remains the task of directing the training of the soldier—the "average" soldier—in order that full advantage may be taken of his ability to absorb training in battlefield observation hand-in-hand with whatever other instruction he receives.

First, however, a decision must be reached as to just how much the unit commander may hope to cover in the time available. In order to arrive at such a decision, he must, as in every other problem, make an estimate of the situation. It has been agreed upon that *all* of his men, and not merely those in the intelligence groups, are to receive intelligence training; he naturally wishes this training to be as thorough as possible. But it must not interfere with their training in their primary military duties, be they riflemen, cannoneers, truck drivers, or mine layers. It must be sandwiched in with this training. Here, then, at the outset he must compromise.

Possibly it has not occurred to most instructors that the basis of all training in observation, which should be common to every man in the army, is contained in that precept contained in the second general order for privates of the

guard, in which the sentinel is enjoined to observe "everything that takes place within sight or hearing." Often it is perfunctorily taught, with no effort being made to apply it to military duty in its broader aspects. Yet, as a matter of fact, it applies not only while a man is walking post, but on all occasions, and on none more than those of the battlefield. Although only 4 hours are scheduled for instruction in interior guard duty, frequent subsequent performance by the soldier of such duty permits the placing of emphasis upon the quoted portion of the order. It may be said that these words indicate, in the briefest possible manner, the mission of the commander, the first thing he must consider in making his estimate.

Since the soldier is to be observant, there follows the necessity for guiding his powers of observation along the most profitable channels. It is not enough to tell him that he must observe everything within sight or hearing, and let it go at that. Indeed, the word "everything", if unduly stressed without explanation, may defeat its very purpose by the alarmingly large amount of territory it would seem to cover. There must be some limit to what men must observe.

What, then, is meant by "everything." Obviously, everything which may have any bearing on the success or failure of the operation which may be under way. Even this is a pretty big order, and the word may be further modified by the explanatory phrase *within the limits of his experience.* Up to the time of his entrance into battle, this experience has been gained in theoretical situations exclusively, although latterly these situations, following the present trend toward realism, are becoming more and more like the genuine article. At the risk of repeating material already outlined in training publications and visual aids, let us see what can be done to furnish him with pre-battlefield experience in "getting the dope," so that he may draw with maximum benefit upon this training when the momentous hour arrives.

In order to insure accuracy of reports, it is necessary that the men practice: estimation of distances; estimation of the size of distant groups of men and vehicles; observation of direction and estimation of speed of movement; and the location, number and types of weapons which are firing.

Certainly all men should be familiar with the essential elements of map reading. As it happens, the training program for an infantry soldier provides for eight hours in this subject, quite enough time, if the course is well conducted. This course can and should ground any man of ordinary intelligence in orienting himself on airphotos, maps, and ground, locating and identifying terrain features, measuring distances, picking up enemy as well as friendly positions, selecting favorable avenues of approach, defiladed areas and concealed positions, and identifying terrain features constructed since the maps or photos were made. The course should also cover, by the "practical work" method, the making of overlays, and of sketches involving the use of polar coordinates. This last is extremely simple, yet is not properly understood by a surprisingly large number of noncommissioned officers and junior officers.

While the infantry training program provides for instruction in map reading during his ninth and tenth weeks of training, nevertheless this does not preclude a little painless insertion of advance instruction in that subject somewhat earlier; even, perhaps, as early as during the second week. It is during the first and second weeks that individual protective measures, recognition of aircraft and mechanized vehicles, and counter-intelligence are taken up, and a little time may be profitably spent on map reading even if it is necessary to utilize a few odd minutes here and there. Of course for night operations, which are taken up in the ninth to twelfth weeks inclusive, a working knowledge of the use of the compass and, to a lesser extent, of maps, is essential.

The subjects mentioned in the preceding paragraph specifically demand and provide for battlefield observations as such. While all military training is, of course, closely

coordinated with a single end in view, that of achieving success in battle, certain elements stand out from the others as offering particularly worthwhile opportunities to provide additional training in battlefield observation as a by-product. These are practice marches and bivouacs, extending over nearly the entire period of basic training; extended order, taken up during the first two weeks, and continuously used thereafter; field fortifications and camouflage, in the sixth and seventh weeks; and tactical training of the soldier, squad, section, platoon, company and battalion, which are covered progressively throughout the entire program. If the instruction is high enough in quality to offer a continuous challenge to the soldier's interest, the sky is the limit in what he may learn in the time allotted.

While all-around alertness is essential to good observation, a commander should not allow himself to be fooled into thinking that an alert soldier always has sound perceptions. Great excitement frequently warps, and may totally invalidate, the perceptions of normally alert men. They must be taught to discipline themselves into a state of calmness, so as to perform their duties of observation—as well as fighting—in a businesslike, matter-of-fact manner. While a crowd becomes wildly excited at a ball game, the sports writer must sit calmly in the press box and record what he sees. Often a doctor must work with unerring hands while the persons about him are giving way to hysteria.

How excitement warps observation is forcefully demonstrated to officer candidate classes at The Infantry School. In the midst of a lecture, several soldiers suddenly run past the front of the class. There is a scramble; one of them is stabbed. One barks a command. Two of them grab a buddy and carry him away.

Under questioning, a large percentage of the class is unable to recall how many men participated in the skit. Hardly any can give the grades of the soldiers. There are always conflicting answers to the questions: How many rifles were carried? What command was given by the cor-

poral? And practically every member of the class is surprised to learn that the man carried off was the one who did the stabbing, rather than the victim.

To convince their men of the need for disciplining their powers of observation during moments of excitement, platoon and company commanders can present skits similar to the one described. Other demonstrations, designed to develop the soldier's powers of observation during periods when excitement is less likely to blur his faculties, are also of value. Examples of such demonstrations as employed at The Infantry School are the following:

A friendly patrol, moving across the front, is fired upon by an enemy machine gun. The instructor asks what details were important. Adequate replies should disclose whether the weapon was a heavy or a light gun, its location, the time it fired, and at whom.

A group of vehicles—for instance, two 1½-ton trucks and a 37-mm prime mover—emerge from woods about 800 yards to the front. The instructor asks the men what information they would report to their squad leaders. He brings out the fact that they should report the number of vehicles observed, the point and time at which they emerged, as well as the direction of movement. Vehicles should also be described as to size and type.

One of the devices most commonly employed, and which is easily prepared, is that of spreading a number of articles on a blanket, permitting the soldiers to study them for a few moments, and, after the articles have been covered, having the men write down a list of the items they observed. This is as much a test of memory as it is of observation, and should frequently be repeated, with variations, until the men show that they can *remember* what they see, as well as merely recognize it.

The above examples all refer to visual observation. Hearing is of almost equal importance. Many individuals who are well-trained in seeing what lies within their range of vision frequently fall short of making efficient use of their sense of hearing. Because of the large amount of night

activity during combat, hearing is a sense which none can afford to neglect. It is not only necessary that a soldier be able to hear well, but also that he interpret clearly what he hears. In order to develop this ability, he must spend many hours listening to various noises at night, and, for briefer periods, with his eyes blindfolded during the day. He should become exact in his ability to name weapons from the sounds they make. He must be able to recognize the starting of a truck, the rumble of tanks, the twang of barbed wire, the scraping of a spade in the earth. Gradually he will become able to estimate ranges by the volume of sound. He will become able to estimate ranges to weapons by the time interval between the flash of the weapon upon discharge, and the noise of discharge when it reaches his ears. It is of interest to note that with practice this latter estimate can be made quite accurately on the basis of the rate of travel of sound—approximately 1,100 feet per second.

During the day, the soldier relies principally upon direct visual observation of the enemy, but at night he must depend largely upon hearing. He may hear enemy soldiers talking, singing or whistling; he should be able to detect stealthy movements in his vicinity. Points which he must determine are: where the sound comes from, what causes it, what time it occurs, and the number of men and the amount and kind of materiel involved.

In all observation, whether by eye or ear, the importance of accuracy should be stressed. Men must be made to realize that an inaccurate report can do more harm than no report at all; however, they must be cautioned not to withhold information for fear that it may not be correct.

Although only facts, not imagination, go into a report, this does not necessarily exclude logical opinions if it is made clear that they *are* opinions (see figure 86). The observer must distinguish between what he knows and what he thinks; what he saw himself, and what he heard from others. During training in observation, leaders should constantly note the tendencies of each individual. Does he overestimate? Does he underestimate? Does he allow a power-

FIGURE 86.—Estimates should not be reported as facts.

ful imagination to distort the true picture? Such faults, when detected, are judiciously brought to the soldier's attention. If he persists in them, a correction factor will have to be applied to any reports he may submit.

Definite terms must be used in reports. Such phrases as "a lot of men," or "a few men" have no place in a report. The soldier should be able to estimate whether a group he saw was approximately the size of a platoon, or a company. And it is much better for him to estimate the rate of movement of the enemy than it is to say that he is moving rapidly or slowly. However, estimates should be reported as such—not as facts.

While a good report comes to the point at once, the best ones being brief and concise, nevertheless nothing of importance should be omitted. Items of importance may include statements as to when and where the enemy was seen; his strength; what he was doing; whether his force consisted of infantry, artillery, engineers, or a combination of any or all of these; his speed and direction of movement; his equipment; his vehicles, whether scout cars, tanks, trucks or weapon carriers. First contact with the enemy should be reported without delay—be it only a scout's signal of "Enemy in sight"—as well as any attempts at infiltration. This last is recognized as of particular importance at this time in view of enemy methods in the Southwest Pacific Area.

A soldier should be trained not only to observe what takes place in his own sector, but also in those adjoining. Too often men devote their attention exclusively to what is happening on their own front, a practice which may well lead to disastrous consequences. An officer who fought in New Guinea relates this anecdote. He asked a machine gunner, "Have we any guns on the other side of this little bay?" The answer was, "I think so." The officer then asked, "How are we going to keep from firing on our own guns, if they are over there?" "I dunno, sir," replied the gunner.

"Me an' my buddy been talkin' about that. But see that creek running into the bay, sir? That's the end of our sector. We don't care about the other shore."

The importance of enemy unit identification is another feature which should be stressed. It may not matter a great deal to the individual soldier what organization opposes him, but information on the subject is vital to higher commanders. The soldier must realize that through the compiling of such information, intelligence units can trace troop movements behind the enemy lines and frequently enable commanders to determine the nature, strength and location of future enemy operations.

Any materiel which helps to identify the enemy is valuable. Along the route of enemy movement, foot and vehicle tracks are examined, with a view to estimating the number and the direction of movement, and also, in the case of vehicles, the type which have passed. While observing the greatest precaution with regard to booby traps, a far greater menace than ever before, a careful scrutiny is made of former enemy command posts, observation posts, and distributing points. Discarded or abandoned weapons, cartridge cases, tank traps, mine fields—a search is made for all of these. Bivouacs and assembly areas may yield papers, books, maps, newspapers, diaries, abandoned equipment, and stores. Anything discovered may be of value to higher headquarters, and should be reported on.

It must become a routine matter to render all reports as promptly as possible. Information is of no value if it arrives too late. It must therefore be transmitted by the soldier to his immediate superior, or to the nearest officer or intelligence man as soon as his primary job of fighting permits. Combat troops must be taught, however, that although they may have secured an important piece of information, and should transmit it when the opportunity arrives, they cannot leave their posts during combat for such a purpose, any more than they can pause to succor the

wounded. Intelligence personnel should not be far off. They will garner information from the small-unit leaders or from individuals in the line during lulls in the fighting.

In training troops other than intelligence personnel in battlefield observation, there is no departure from long-established principles and training methods, but rather a broadening of the application of those principles and methods; a keeping up with the times. Commanders who have made a good job of this training will find their men ready and eager to supply them with the right "battlefield dope" when they most need it. That they *will* need it should be pretty clear to everyone.

CHAPTER 13

Camouflage of the Heavy Machine Gun in Attack

In spite of the instructional material produced on the subject of camouflage, little has been written on one phase which is a matter of life and death to many infantrymen—the concealment of the heavy machine gun in the attack. For this gun and its crew there is always "open season." The machine gun which backs up the riflemen's attack is a primary target for hostile tanks and the defender's infantry cannon, mortars, machine guns, and automatic rifles. It draws alike the massed fire of the enemy rifle squad and the carefully aimed bullets of the sniper. It is important enough to be searched out by antitank guns, artillery, and dive bombers, and by raiding patrols.

In the defense, camouflage of the heavy machine gun is not too difficult a problem. The latest Tables of Equipment include a camouflage net for each gun. Effective techniques and expedients have been developed, even to the extent of hiding the muzzle blast; and where there is skill, time, and available materials, defensive camouflage can almost reach perfection.

But the attack requires frequent and rapid displacements, and fires delivered from unprepared positions. Hence there are many situations where defensive camouflage technique is of little value. Training literature usually lists concealment of the gun in the attack as the third or fourth point of consideration in selecting the firing position. This is as it should be. The machine gun's paramount mission is to put effective fire on the enemy without hitting the supported riflemen. Nevertheless, unless attention is given to the concealment of the gun and its crew, enemy fire may prevent the mission from ever being carried out.

There are certain obstacles in the way of satisfactory camouflage of the heavy machine gun: its natural black color, and the characteristic silhouette of the cylindrical water jacket with a "shine-line" reflected from the sun.

At first thought the problem would seem easily solved by pattern painting the gun and tripod. Paint used for this purpose must have a hard finish to prevent chipping or breaking from the rough treatment the gun receives, and must have a dull finish to prevent reflection of sunlight. There are two types of removable paint available from the Engineer Corps. One is a water-soluble paint which is valuable for color experimentation because it can be easily removed. It is too soft, however, to be practical for field use. The other is a gasoline-soluble paint which is impervious to water, withstands hard knocks, but can be washed off easily with gasoline when a change is desired. Both of these paints are available in a variety of shades of green, sand, and brown. Exterior surfaces of the entire gun should be painted with an appropriate color and shade to provide a base coat over which pattern painting can be applied. In selecting a pattern to be applied to the gun, it should be borne in mind that the horizontal lines of the upper and lower edges of the water jacket are in direct contrast to the vertical lines of the grass and brush which frequently surround the gun position. The pattern selected, therefore, should be one which tends to break up these horizontal lines so they will blend more readily with their environment.

In pattern painting the gun, it is best to start by breaking the horizontal lines of the cylinder of the water jacket into two parts by applying an irregular mass of darker paint near its middle; then paint small, irregular dark patches at the top or bottom and toward each end of the cylinder to hide its square-cut ends against any background. In painting the receiver and tripod, the effort again should be to break the horizontal mass—the characteristic silhouette of the object—and especially to break the top and bottom edges, where solid color would form a

horizontal line, in contrast to the vertical lines of the background. (See figure 87.)

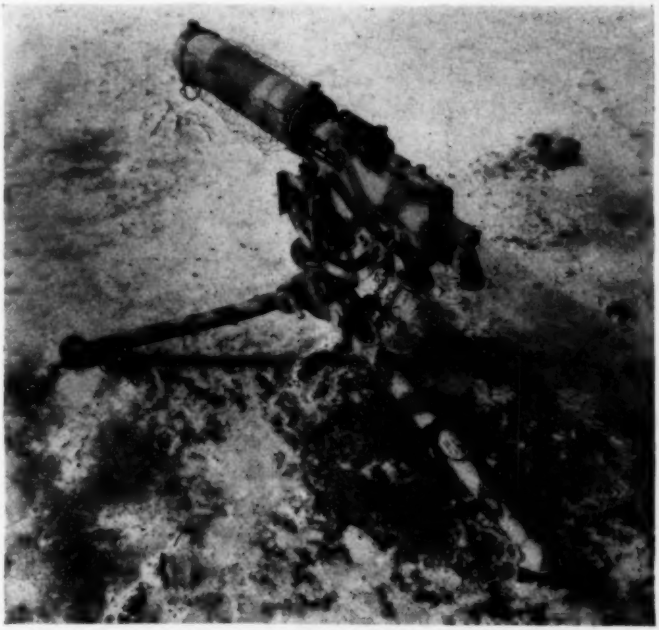


FIGURE 87.—Close-up view of a pattern painted heavy machine gun with the poultry wire attachment. Note that the shaded areas are almost as black as though they had not been pattern painted, indicating the ineffectiveness of pattern painting alone as a camouflage measure.

Experiments disclose that pattern painting alone will not entirely solve the problem as concerns the shaded surfaces of the gun. On dull days, a mottled pattern of well-chosen colors proves extremely effective from all angles. In direct sunlight, however, although this paint is quite effective from the illuminated side of the gun, the shaded side, when viewed from 100 yards, presents the same familiar silhouette in a shade almost as black as the unpainted gun. Again, the cylindrical water jacket is the

chief identifying characteristic. In extremely bright sunlight, the shine-line along the surface of the water jacket persists even though a dull-finish paint is used.

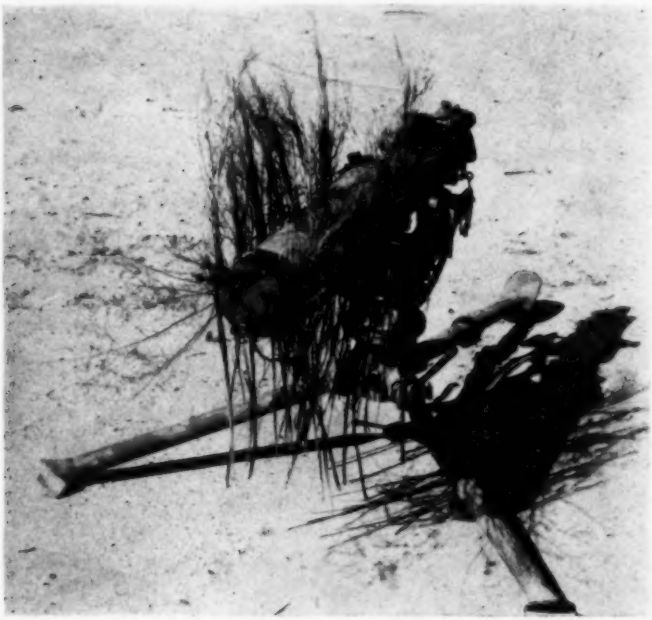


FIGURE 88.—Against the straw-colored grasses of winter, a combination of paint and natural camouflage is necessary to diffuse the silhouette of the water jacket. Bushy weed tops protrude to the front to hide the square-cut end of the water jacket. A path is left down the center for sighting.

The most obvious method of dealing with the shaded surface is to break up and confuse the silhouette with more shadows, preferably by the application to the gun of nearby vegetation. But here we encounter a major problem. There is no way of applying natural camouflage materials directly to the gun without interfering with its operation, and in the attack there is no opportunity to erect anything around or over the weapon. Any material stuck into the

cradle or around the receiver will interfere with the use of the sights or with traversing, and the vibration of the gun during firing has a tendency to jar loose any such material.

A partial answer to this problem is the poultry-wire device attached to the gun, as shown in figure 87. This consists of two strips of poultry wire loosely applied to the two sides of the water jacket by means of pipe-hanger straps. The latter, obtainable from any plumbing or electrical contractor, are soft iron straps with holes punched on ½-inch centers, and can be bent around the jacket and fastened with stove bolts. This device enables the crew to decorate the water jacket quickly with available grass, weeds, or branches, and to do so without interfering with the operation or mobility of the gun. A representative mixture of the vegetation growing about the gun should be selected and applied vertically, leaving long stems hanging below to blend with the other growth. (See figure 88.) A couple of bushy weed tops inserted from the front will hide the disc-shaped end of the water jacket. Any leaves or grass blades interfering with the use of the sights can be broken off. This could be done each time the gun is set up, if time and the action of the enemy permit, and usually would be done in rear of a crest, where the gun is mounted, since the material thus applied will not interfere with dragging the gun forward into firing position.

This leaves the receiver uncamouflaged except for paint. This is unavoidable for operational reasons. However, the material placed on the water jacket prevents easy identification from the flank even when a shaded silhouette of the receiver is visible, and it effectively hides the entire gun from the front. (See figure 89.)

Experiments have shown that in actual use, especially in summer vegetation, this expedient is very satisfactory. A common error is the use of too much large leafy material instead of a representative mixture of the surrounding vegetation. Snow-covered terrain necessitates the application of special principles of camouflage which are not

covered herein. However, in winter climates such as that of the Fort Benning area, where these tests were conducted, snow is quite infrequent but vegetation changes color from green to various shades of brown. Under these conditions,

FIGURE 89.—The horizontal shine-line and sharp-edged shadow on the water jacket of the rear gun is contrasted with the diffused lights and shadows of the camouflaged gun.

it will be found that a light-colored paint job, with dead grass and leaves to confuse the highlights and shadows of the gun's water jacket is a successful combination. (See figures 90, 91, 92, and 93.)

During several months of daily use in an attack exercise the poultry-wire attachment stayed in place and caused no inconvenience during displacements.

Although not as satisfactory as a permanent installation, baling wire can be used instead of the metal straps to attach the poultry wire; and twine net can be substituted for the poultry wire as a temporary expedient.

FIGURE 90.—A camouflaged gun and an uncamouflaged gun mounted in the dead grass of winter. A high wind is blowing and the vertical grass stems inserted along the water jacket of the camouflaged gun contrast slightly with the curved lights and shadows of the bending grass. Note the effectiveness of the pattern painting on the sunny side of the receiver and compare with figure 91 of the same guns as viewed from the shadowed side.

No study of camouflage is complete without considering the air view. This is also one of the machine gunner's worries, since machine-gun platoons spotted from the air often draw bombing and strafing attacks, not to mention the artillery fires which are adjusted onto the target by means of air observation. The expedients already mentioned will assist in avoiding detection from the air. How-

ever, the machine-gun corporal should bear in mind the gun's background as seen from the air before jabbing his cleaning rod into the ground at the selected position.

FIGURE 91.—The same guns as those shown in figure 90, but viewed from the shaded side. The receiver of the painted gun appears as black as that of the unpainted gun. The grass on the water jacket of the camouflaged gun helps to break up the horizontal shine-line and shadow, even though the vertical stems fail to blend with the wind-blown grass.

Experiments conducted last summer involved a machine-gun platoon on an exposed hilltop, and disclosed some astonishing variations in the degree of visibility of the guns from the air. The observer was thoroughly familiar with each of the gun positions and with the entire area in which they were located. One uncamouflaged gun, sited on a bare sandy spot approximately 10 feet in diameter, was easily seen from 3,000 feet (the highest altitude flown

during the experiment), and when firing, was easily identified by means of the dust created by the muzzle blast. Another uncamouflaged gun, sited in green grass 6 inches tall, was not seen by the observer from altitudes above 1,000 feet, and was not seen by the pilot (who did not know the gun locations) until the 800-foot level was reached. A pattern-painted gun, with the poultry-wire attachment was

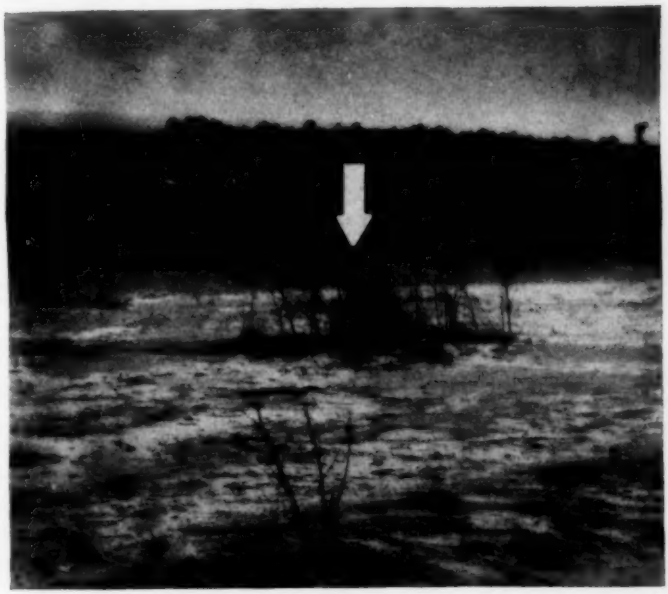


FIGURE 92.—Shows the same area as that shown in figure 93, but with an uncamouflaged heavy machine gun placed in the bushes of the foreground. Note the shine-line reflected from the water jacket of the gun.

moved 15 yards from its usual firing position without the knowledge of the observer, into a sparse growth of 10-inch weeds; the gunner and assistant gunner garnished themselves and the gun with the weeds at hand. The observer made three flights over the position at elevations as low as

25 feet without seeing either the gun or the crew, although he did see each of the uncamouflaged men of the ammunition chain. The last two guns were not fired during the test.

FIGURE 93.—Shows the same area as that shown in figure 92, but with a heavy machine gun, camouflaged as described in the text, placed in the bushes of the foreground. Compare with figure 92.

It is not intended that the altitudes mentioned above be taken as the limits of visibility when similar backgrounds are used. On the contrary, these results would doubtless be materially affected by the time of day when the test was conducted. The above test was made at 1400. Similarly the results would be affected by the atmospheric conditions and the seasonal colors of the vegetation. The important point established by this test is the wide variation in degree of visibility caused solely by a difference in background of the gun positions as viewed from the air.

So far, we have considered only the means of hiding the gun itself with no thought for the problems of sound, smoke, and dust while firing. The enemy will not be able to locate the gun accurately by sound alone; and in dry air, particularly if some wind exists, the smoke haze is thin and the origin uncertain. In damp air, there is a great deal of smoke produced, and there appears to be no solution for this. If the water jacket is kept full of water, steam will be produced only after several minutes of rapid fire, and hence is not normally a problem in an attack. In dry areas, where dust covers the vegetation, some visible muzzle blast will be created; but in average green terrain, it can be prevented by avoiding bare ground. And, of course, we assume that the gunner will be smart enough to remove the tracers from his belts (except when specifically required to adjust fire at unknown range on wet ground, or in engaging airplanes), because tracers can be seen quite readily from the receiving side.

In conclusion, it is important to remember that no camouflage material or camouflage expedient, no matter how perfectly designed or how cleverly conceived, is of any value unless the enemy is actually fooled. It is, therefore, essential in all training to observe and check constantly from the enemy's point of view in order to determine whether unit camouflage methods are really effective, or are merely a case of the ostrich burying its head in the sand.

CHAPTER 14

An Improvised Opaque Projector

An opaque projector is a device for projecting on a screen, or other flat reflecting surface, an enlarged image of a photograph or other material. It will project almost anything which is not transparent and not larger than approximately six inches square. Pages from books, photographic stills, maps, diagrams, and small pieces of equipment can be projected with this device. The reader is doubtless familiar with types of opaque projectors which are sold commercially under various trade names, such as Baloptican, Delineascope, or Reflectorscope.

The opaque projector is a valuable aid to military training. After successful use in the various Service Schools, it has been recently authorized as an item of issue. The issue, however, is necessarily limited, and the purpose of this article is to point out the value of the opaque projector as an instructional aid to the small-unit leader and to show how a simple projector may be constructed and employed.

The following are only a few of the ways in which the projector is useful in the training of the infantry squad and platoon.

Projection of illustrations.—Many training publications have excellent illustrations and diagrams, but there are seldom enough copies available to distribute to all individuals in the unit. This shortage may be overcome by means of opaque projection. Another advantage is that a picture or diagram projected onto a wall or screen can be seen and studied by every member of the group. At times, reference to a particular part of a projected image will be simplified by pointing. Often such a reference is difficult to indicate when each man is using an individual copy of the picture or diagram.

Projection of solid objects.—Frequently, an instructor is confronted with the problem of training in the nomencla-

ture of a weapon, although he does not have enough weapons to distribute to the men. The plans presented herein for the construction of an opaque projector indicate an aperture on top of the projector. The box may be turned upside down, however, and used just as satisfactorily. In this position, small parts from any weapon can be placed on a white sheet of paper and their images projected onto a screen. However, large parts which present a depth of more than one-half inch cannot be shown clearly, because only a few sections of the part will be in focus at one time.

Reproduction of sketches and diagrams.—Many field manuals and other publications contain diagrams, charts, and simple sketches which are excellent aids to training. By using the opaque projector to reflect these illustrations onto large sheets of paper, practically any man in the unit can produce a full-sized training chart. It is necessary only to outline or trace the projected image onto the paper. (See figure 94.) The resulting chart or diagram will not only be accurate in detail, but will be in the exact proportions of the original.

Tactical training.—The occasion may arise where the instructor is unable to obtain a sufficient number of maps of terrain which he wishes to use for the tactical training of his unit. By the use of opaque projection, he can project any part of the map to a size sufficient for a classroom lecture or critique. The same procedure will often be a distinct aid in preparing the men for a field exercise.

The opaque projector should not be considered as a substitute for any of the various methods of training now being employed. It is intended as an additional aid, for incorporation in the present scheme. It is also an excellent training expedient for rainy-day schedules, but should not be used exclusively for this purpose.

Thus far, only the advantages to the instructor have been mentioned. Of even greater importance are the benefits afforded the members of the class. Assume, for example, a group being instructed in the identification of terrain features. With a pertinent photograph projected onto a wall or screen, the instructor points to a crossroad; the man

being questioned might answer that it is a road junction. The instructor then corrects him, pointing to a road junction and explaining the difference between the two. During the discussion, the instructor can be sure that his men are all looking at one point on the picture instead of at several different points, which will often be the case if individual pamphlets are distributed. With the projection method of teaching, everyone in the class can benefit from the errors made by the man who recites and from the corrections made by the instructor.

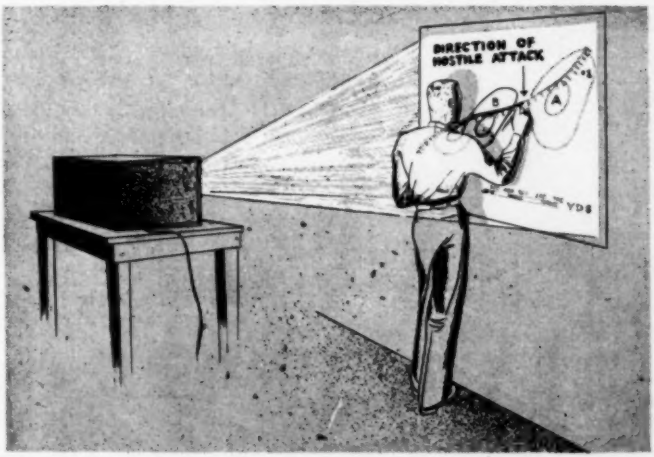


FIGURE 94.—In tracing projected pictures or diagrams, the artist must stand to one side of the projected image, so his own shadow will not cover the projection.

PRINCIPLE OF OPERATION

The principle of operation of an opaque projector is simple. A bright light cast on the subject is picked up by a mirror which is sloped at an angle of 45 degrees to the subject. This light, carrying the image of the subject, is reflected from the mirror, through the lens of the projector and onto the screen. (See figure 95.) During this course, the image is reversed twice, once when picked up by the

mirror, again when it passes through the lens. Thus, the resulting picture will be in the same position as that of the object or picture which was exposed to the light.

Materials For Construction

In designing the improvised projector which forms the subject of this article, the purpose was to build a satisfactory projector of the simplest type from the most ordinary and easily obtained materials.

If better materials and facilities for construction are available, a more desirable projector than that described herein can be made. The simple principles of opaque projection, outlined above, must be incorporated in any such device. Better reflecting surfaces, better lenses, brighter lighting, or greater compactness of the entire instrument will produce a projector more nearly approaching the perfection obtained in expensive commercial-type projectors. Construction of the projector described herein will not only provide a device which is usable in instructing a squad or platoon, but will also familiarize the builder with the principles of opaque projection so that he can subsequently construct a projector which will produce a larger and more distinct projected image.

The projector shown in figure 96 was built, as nearly as possible, from materials which are readily obtainable by any training unit. The box originally contained antiaircraft parachute flares, M1, but boxes used for packing caliber .30 or caliber .50 ammunition are about the same size. In selecting the box, choose one which is made of wood thick enough not to warp when exposed to the heat of the powerful light bulbs. The wood used for the interior construction can be cut from available scrap lumber which should be at least ¾″ thick and thoroughly seasoned to prevent warping.

The mirror measures 5″ by 7″ and can be obtained from any glass company or hardware store. The mirror must be of plate glass, free of imperfections. Mirrors made from ordinary window glass will cause distortion of the reflected image, and the enlarging process involved in projection

will magnify the distortion to such an extent that the projected image cannot be brought into sharp focus.

Mirrors, if available, may be used to line the light compartments and act as reflectors. Lacking mirrors, sheets of tin cut from three No. 10 tin cans may be bent and placed in proper position to give maximum reflection of light onto the subject to be projected.

The two electric light sockets used are standard wall sockets. The bulbs are large size and of the ordinary commercial type. They may be of 150-watt size or larger. The brighter the bulbs used, the more distinct will be the pro-

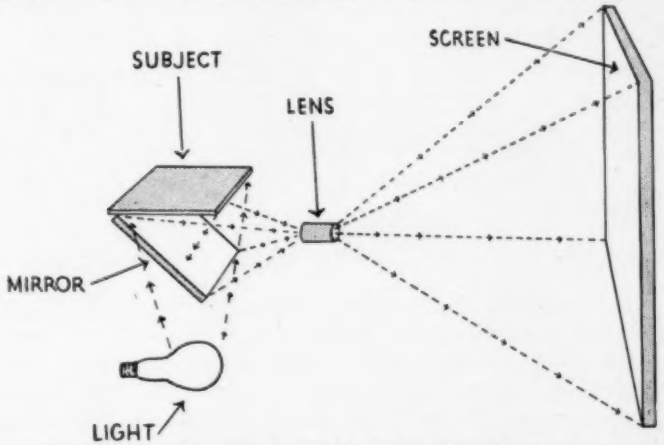


FIGURE 95.—Diagrammatic illustration of the principle of opaque projection. Light cast on the subject is reflected from the mirror, through the lens of the projector, and onto the screen.

jected image. Photoflood bulbs produce a very bright light, but also a correspondingly intense heat. They have a life of only a few hours, but are inexpensive. This type of bulb can be used if the subject is not exposed to the heat long enough to cause damage to it.

The wiring can be done with any available extension cord or any other insulated copper wire which is not too heavy.

The procurement of a satisfactory lens constitutes the greatest problem. Because of priorities, it is difficult to

obtain lenses from any of the large optical houses, so the lens will have to be procured locally. If afforded a choice, the selection should be based upon the size of the room in which the projector is to be used. The greater the focal length of the lens, the farther from the screen will the projector have to be placed in order to produce a projected image of adequate size. TM 11-401, Appendices I and II, shows the necessary distance from lens to screen to produce an image of a given size from 16-mm and 35-mm films, when using lenses of different focal lengths. These charts will serve as a guide in the selection of a lens for the opaque projector. However a lens of almost any focal length may serve the purpose because of the variety of possible distances from lens to screen, as well as the variety of sizes of image that may be projected. Often, photographic studios have lenses from old cameras which can be used very satisfactorily. Similarly, lenses from abandoned or worn out motion picture projectors might be adapted to this use.

CONSTRUCTION

The following explanation of the construction of an improvised opaque projector is based on the dimensions shown by figure 96. When working with a box of another size, appropriate alterations must be made in construction.

Remove *one* of the *large* sides of the ammunition box. This large side will be the *top* of the opaque projector—all other sides should be nailed in place. (See figure 96.)

Cut an aperture 6″ x 6″, in the center of the top of the projector.

Next, bore a hole in the exact center of the front side of the box. This hole, which is to house the lens, should be as large in diameter as the lens plus the amount of padding to be placed around the lens. The padding is to permit a tight enough housing to hold the lens in position and prohibit the escape of light around the lens. It will also permit moving the lens forward or back for focusing. The inside of the box must now be divided into three compartments, one for each of the two light bulbs and one for the mirror

(see figure 97). The center compartment, which will contain the mirror, should be approximately 5½" wide depending upon the width of the mirror, and exactly in the middle of the box. The walls of these compartments should be approximately 5" high, just high enough to prevent the

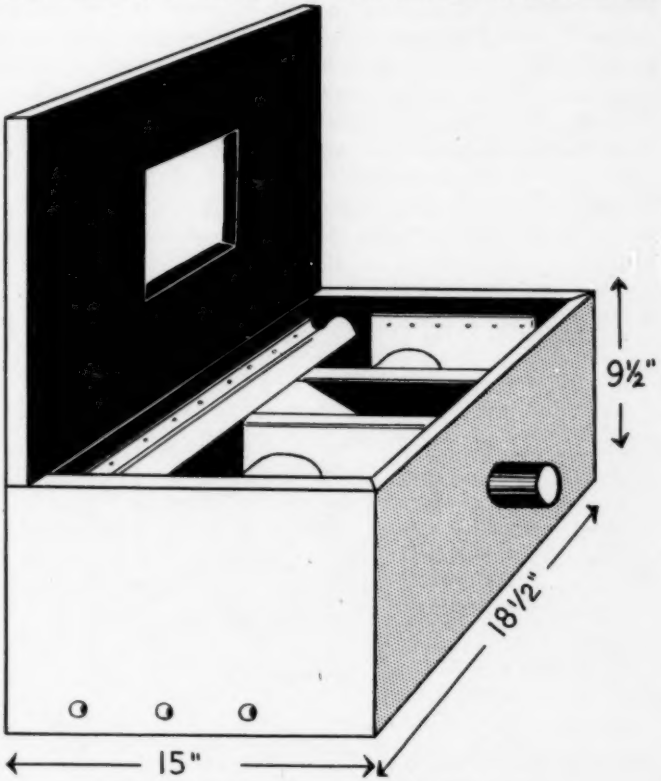


FIGURE 96.—The finished improvised opaque projector.

direct light rays from striking the lens and the mirror.

The next step is to install the electric wiring. The location of the holes in the box to admit the wires will depend upon the type of light sockets to be used. If they are the type that will permit wires to be introduced from the sides,

fasten them onto the box with screws, one socket in the center of the rear wall of each end compartment. A small hole in the side of the box will then be necessary to admit the extension cord. Run the wires through the hole in the side of the box, connect them to the first socket; then pass them over and to the rear of the compartment walls and connect them to the second socket, in parallel, as indicated in figure 98. If the sockets are the type which require wiring from the back or base, it will be necessary to bore holes of about 1½" diameter in the exact position where the sockets are to be placed. Screw the sockets in the box over

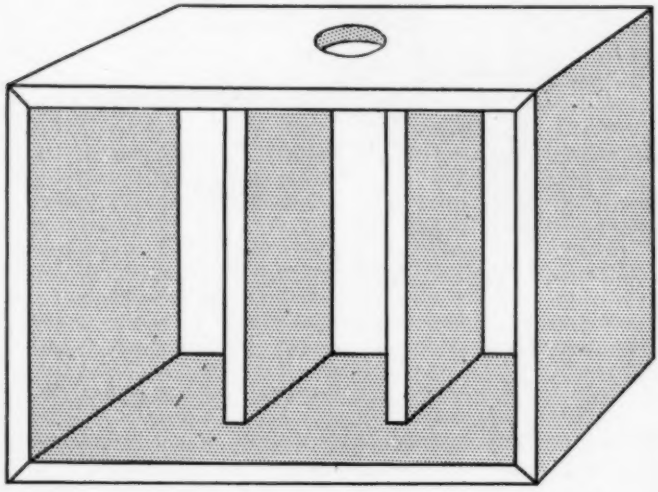


FIGURE 97.—The interior of the box is divided into three compartments. The center compartment will house the mirror, and the two end compartments will each house a light and reflector. In this diagram, the interior of the box is viewed from the top.

these holes and complete the wiring, as indicated in figure 99, from the outside of the box. In wiring the box, it is advisable to obtain the aid of a person with experience in electrical work, because faulty wiring of the box will reduce the light power and prevent satisfactory projection.

Since the success of opaque projection depends greatly upon the amount of light which directly strikes the picture or object to be projected, it is necessary that some type of reflectors such as tin cans be installed in the box. Remove both ends from a No. 10-size can, and split it down the seam. Bend this strip of tin to make a J-shaped reflector which will fit under and partly around the light bulb, as indicated in figure 100. A similar reflector should be installed around each light bulb. The circular ends of the cans may be nailed in the front corners of the light compartments to increase the light reflected onto the picture. It is advisable to bore several small holes in each side of the box, below the line of reflectors, to allow air to circulate and to prevent overheating. Any openings made for this purpose must be shielded to prevent the escape of light.

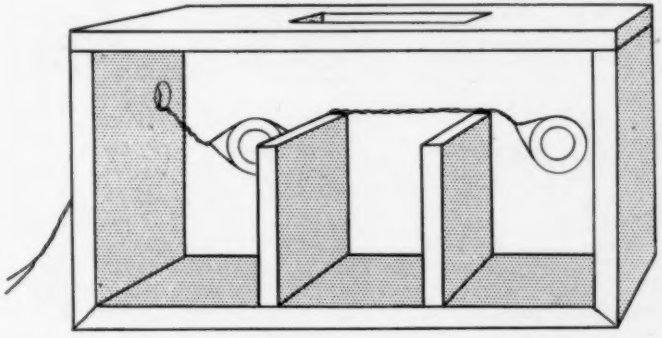


FIGURE 98.—This system of wiring can be used only if the light sockets are of the type to which wire connections are made on the sides. In this diagram, the interior of the box is viewed from the front.

Cut a third tin can and make a back reflector. This should extend the length of the box, passing over the necks of the bulbs, the compartment walls, and the top edge of the mirror. To do this, the tin must be bent lengthwise into an S-shape (see figure 101) and nailed to the top of the back wall of the box. The use of tin cans is merely an expedient.

If mirrors or commercial reflectors are available, they can be arranged to give more satisfactory results.

The mirror should be approximately 5″ by 7″. It must be placed in the center compartment of the box, directly beneath the aperture in the top of the box and in front of the lens opening. It is essential that the mirror be placed at an angle of 45 degrees to the subject and the lens. In this position, the image of the picture will be reflected directly into the lens. The mirror can be nailed into place, or slots can be cut in the compartment walls to hold the mirror in position. If two or three slots are cut in each wall, it will permit placing the mirror at different distances from the lens and will facilitate focusing.

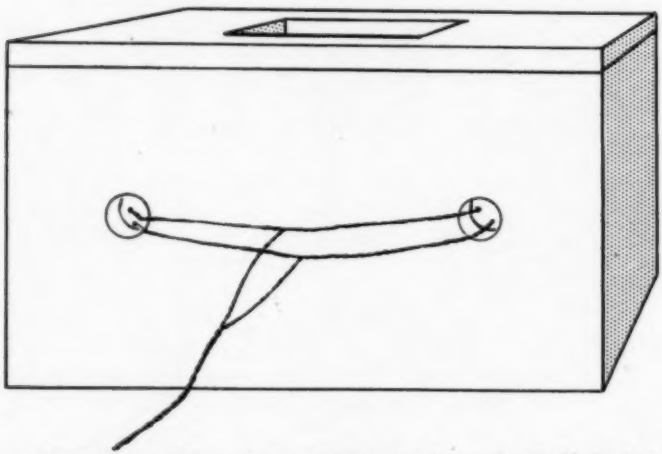


FIGURE 99.—This system of wiring can be used only if the light sockets are the type to which wire connections are made on the bottom. This diagram shows the back of the box.

The clearness of the projected image will be increased by blackening the bottom of the box top, including the sawed edges of the aperture and all other parts of the box interior which are not covered by tin. A dull-finish black paint should be used for this purpose. The most convenient way to accomplish this is to paint the entire inside of the

box, including the compartment walls, before assembling. Black felt, or other heavy black cloth, can be used to prevent light from escaping through the space between the lens and lens hole. For ease in handling, the top may be hinged in place or may be secured by screws. It should, however, be easy to remove in order that light bulbs may be changed or the mirror adjusted.

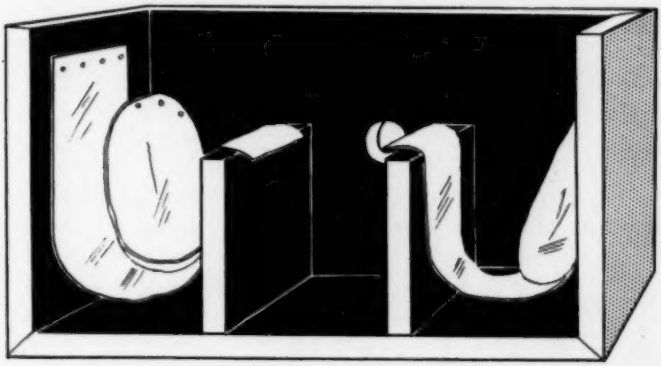


FIGURE 100.—A strip of tin made from a No. 10 tin can, is bent into a J-shape and nailed in place around each light bulb. Two circular ends from the same tin cans may be nailed in the front corners to further increase the reflecting surface. This picture shows the interior of the box as viewed from the rear.

PROJECTION ROOM

Any room suitable as a classroom may be used as a projection room. It is necessary, however, to shut off all outside light, as any stray light coming into the room will reduce the clarity of the projected image. The darker the room, the clearer the projected image will be. There are many methods of darkening. TM 11-401, paragraph 11*b*, suggests several of these. Heavy dark window-blinds will prove satisfactory, but care must be taken to prevent light from entering around the sides. A less expensive means of shutting off the light is to hang black cloth over the windows. To save time, if the same room is to be used often, the cloth can be threaded on a draw cord and opened

or closed to suit the occasion. If the windows are small, shelter halves or blankets can be hung over the windows. A fan should be used to increase the circulation of the air in the room, because a stuffy room will cause the men to become drowsy.

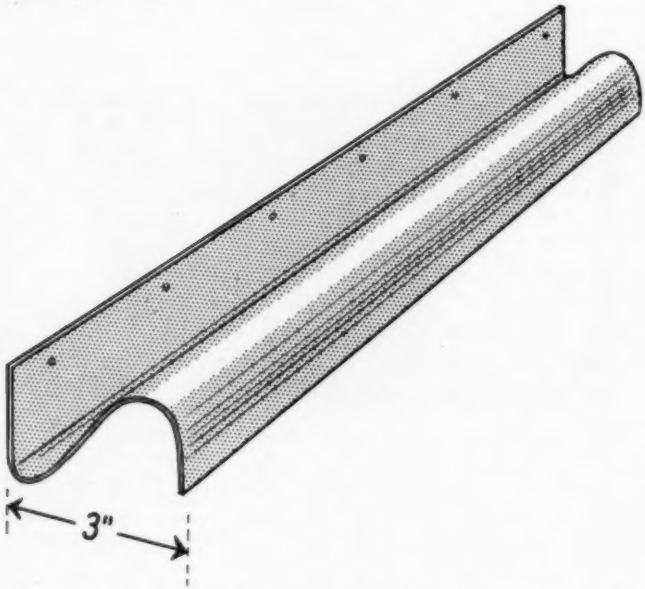


FIGURE 101.—This reflector, made from a strip of tin taken from a No. 10 tin can, should be nailed to the top of the back wall of the box.

SCREEN

The most satisfactory screen is a commercial-type, portable screen approximately 52 inches high and 72 inches wide. Signal Corps film libraries have this type of screen available for use with training film projectors and film strip projectors, and will frequently be able to lend it for this purpose.

A large sheet of white paper can be used in place of a commercial screen. In lieu of either, the wall of the room may be used, if it has a fairly smooth surface and is white

or light buff color. An unpainted plaster wall will serve satisfactorily. A sheet or other white cloth is unsatisfactory because it absorbs light, and the audience can see only the light that is reflected from the screen.

USE

This projector is not designed to be used in the instruction of groups larger than a platoon. For groups up to and including a platoon, it will be very satisfactory.

Before using it as an aid to instruction, determine the distance it must be placed from the screen. After placing it in this position, determine how far to each side of the line of projection the men may sit. The farther to the side the spectator sits, the more distorted the image on the screen will appear to him. It is, therefore, advisable to place as many men as possible directly in front of the projector and below the line of projection. A platform or high stand should be provided to hold the projector.

The principles of opaque projection are definite; however, there are many designs in which the box may be built to incorporate these principles. The plans offered here represent only *one* method of making an opaque projector. If a box of different size is used, if mirrors are used as reflectors, or if any other similar variations from the plans explained above are adopted, corresponding changes in the detailed construction of the machine may be necessary. However, once these plans are carefully studied, the builder will be sufficiently familiar with the principles of projection so that he can make any minor changes and adjustments that may be necessary.